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CAMBRIDGE
GEOGRAPHICAL READERS

III

THE BRITISH ISLES

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PART I. THE PRINCIPLES OF GEOGRAPHY

1. THE EARTH

It is not easy for young people (nor for grown-up people either) to realise that we live on the surface of a great ball that is travelling through space at an enormous speed spinning all the time. This huge ball, that we call the earth, is like a cannon-ball in another way, for although it has a stony surface, the interior is probably composed mainly of solid iron. It is easy enough to say that the earth measures about 25,000 miles round, but it is difficult to conceive really what the figures mean. If we think of a big ship sailing for day after day at full speed and seeing nothing but sky and sea all round every day for a fortnight, we can get some faint idea of the size of a great ocean.

Although the earth appears to be flat, we know that it is not really so. One way in which you can easily prove this is by watching a ship disappear over the horizon. You will be able to see the masts when you can no longer see the hull of the ship. This shows that the surface of the sea is curved; and although there are several slight bulges and flattenings at different parts of the earth's surface, we may, for all practical purposes, think of it as a round ball.

The amount of land and water on the surface of the earth is by no means equal. The area of the water is about two and a half times the area of the land, or, putting it another way, two-sevenths of the earth's surface is land, while the sea occupies five-sevenths of the surface. The arrangement of the land and water is peculiar. Look at a map of the Northern and the Southern Hemispheres. There is plainly far more land in the Northern Hemisphere. The Southern Hemisphere is mainly water. Careful measurements would show that there is actually thirteen times more land in the Northern than in the Southern Hemisphere.

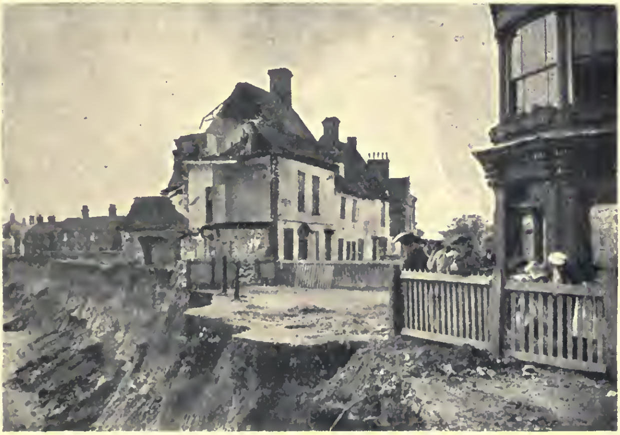
There is another very strange thing about the arrangement of the land and water on the face of the earth that you would never guess at first sight. The antipodes of a piece of land is practically always a piece of water. Thus on the opposite side of the globe from North America is the Indian Ocean, Australia is the antipodes of the North Atlantic Ocean, Europe and Africa are exactly opposite the Pacific Ocean, there is an ocean at the North Pole but a continent exactly opposite at the South Pole. This curious result has not come about merely by chance, but the explanation is too difficult for young scholars.

The land surface of the earth is not smooth, but is ridged and wrinkled in certain parts, and the wrinkles are called mountain chains. The greatest mountain system in the world stretches under many different names from the west of Europe to the east of Asia. It begins in the Pyrenees, and continues in the Alps, the Caucasus, the Persian mountains, and the Himalaya, stretching thence in high ranges to the north-east of Asia. The highest part of this mountain system is 29,000 feet, or about 5½ miles above sea-level. It is interesting to note that this distance is nearly the same as the greatest depth of the ocean below sea-level. So far as is known the deepest part of the Pacific Ocean is 31,600 feet deep.

The Pacific Ocean is the largest expanse of water in the world. From north to south it stretches for about 7000 miles, while from east to west it is about 10,000 miles at its widest part. The deepest parts of the ocean floor are found in the western Pacific. In the north-west Pacific a long and deep hollow exists called the Challenger Trench. The sea-floor is deeper here than in any other part of the world. The islands of the Pacific Ocean are of two types that differ very strongly, namely, "high" and "low."

The "high" islands consist of rock that once flowed white-hot and molten from volcanoes. They contain mountains often thousands of feet in height. The scenery is magnificent and the vegetation is luxuriant, beautiful, and varied. The "low" islands are often not ten feet high. They have been built up by the skeletons of millions of tiny animals, the remains of which form coral rock. Often the coral-reefs are ring-shaped and enclose a lagoon. The swell of the great ocean thunders on the deserted, outside beach, while the huts of the inhabitants cluster round the calm waters of the lagoon. The low islands are generally poor in vegetation.

The Atlantic Ocean is neither so big nor so deep as the Pacific. The deepest part of the Atlantic Ocean is found north-east of the West Indies, and is called the Virgin Deep. The Atlantic Ocean is continuous with the Arctic Ocean, but the boundary is usually taken from the south of Norway to Greenland. The sea here is comparatively shallow. This is fortunate, for the rise of the sea-floor acts as a barrier to shut out the icy waters of the Arctic Ocean.



Coast erosion at Pakefield, Suffolk

We must not think that the distribution of land and sea has always been and always will be as it is now. Sea and land are continually struggling with each other for the mastery. In some places the sea is being silted up, and so the land area is increasing. In other places cliffs are being undermined and every now and then new slices of the land are carved away by the waves. For example, the Fen district of England has been largely reclaimed from the sea, while not far away on the coast of Suffolk the sea is gradually encroaching on the land.

Even on the land itself there is nothing stable. Agents are continually at work wearing away the mountains and filling up the valleys. In time our country will be worn down to a low, flat plain, then it will be upraised again into a plateau, then mountains and valleys will be carved from the plateau, and once again the process of wearing the mountains down to a plain will recommence. This series of changes has taken place many times already, and will probably occur many times again. When we think that it takes many thousand years to complete each series of changes we get some idea of the immense age of the earth we live on.

Winds, frost, ice, rain, and rivers are the chief agents in wearing down the land. The wind is most effective in desert lands where it uses the sand to scour away the rocks. Frost can shatter the strongest rocks, and the fragments are broken up, and carried away by ice or rivers. Glaciers rub away the rocks over which they pass like great files. Valleys are deepened by them, and ridges are cut away.

Rivers, however, are the chief agents of destruction in this country. They are continually at work hollowing the land, carrying stones, sand, and mud towards the sea, and then dropping their loads as they reach the flat lands near their mouths. Remember, too, that rivers are not permanent and unchanging. They are born, increase in size, become old, and die. They are constantly at war with one another, and each grows at another's expense. Of course, the changes take place so slowly that it is only by very careful observation that we can detect them.

2. THE CLIMATE AND NATURAL REGIONS OF THE WORLD

By the climate of a country we mean the average weather throughout the year. There are hot countries and cold countries, wet countries and dry countries, countries where the winds are strong and steady, and countries where the winds are light and variable. In brief, the three most important things in climate are temperature, rainfall, and winds.

The tropics, that is, the lands about the equator, are hot countries. There are no spring, summer, autumn, and winter in these lands. It is hot all the year round. The only difference throughout the year is that there is a dry season and a wet season. Farthest away from the equator, that is, around the poles, the climate is very cold. There are two seasons, summer and winter, each lasting for six months. In summer there is perpetual daylight, for the sun never sets. In winter there is one long night, which at the extreme poles lasts for six months. Between the tropics and the polar regions are the temperate lands, such as we live in, with four seasons in the year.

Some parts of the earth are rainless. Day after day the sun blazes down from a blue sky. Sometimes clouds form, but they pass away without bringing the welcome rain. In other parts of the world it rains heavily and almost continuously all the year round. Most parts of the world, of course, have climates between these two extremes. There are wet days and sunny days in pleasant alternation.

Lastly we must consider the winds that blow over the surface of the earth. This subject is rather dry, but it is very important and not difficult. The diagram on p. 8 represents roughly the directions of the winds of the world. It is plain that there are several belts or zones where the winds are fairly steady. There are three belts where calms or light, variable winds prevail. One is over the equator, one over the tropic of Cancer, and one over the tropic of Capricorn. Between the Doldrums (calms of the equator) and the calms of Cancer there is a region where the winds blow steadily from the north-east. This is the belt of north-east Trade Winds. In the Southern Hemisphere there is a corresponding belt of south-east Trade Winds. North of the calms of Cancer the winds blow from the south-west. Over most of the temperate regions of the world westerly winds prevail.

In our own country, for example, westerly winds blow during about two-thirds of all the days of the year. In the Southern Hemisphere there is another belt of westerly winds, coming as a rule from the north-west. In this southerly region the westerly winds are very strong and steady, because there is very little land to interrupt their force. They are sometimes called the "Roaring Forties," because they are very strong south of latitude 40° S. Antarctic explorers tell us that still farther south the winds blow nearly all the year round with the force of a heavy gale.

Now let us start at the equator and travel northwards towards the pole, and see what kinds of climate we should experience. About the equator the weather is hot all the year round. This district is also very rainy. In some parts of this belt it rains every day in the year. In other parts there may be one or two short, dry seasons when the only rain comes from violent thunderstorms, but for the rest of the year the rain will come pouring down for weeks on end. The whole country is covered with a thick, warm mist. The hot,

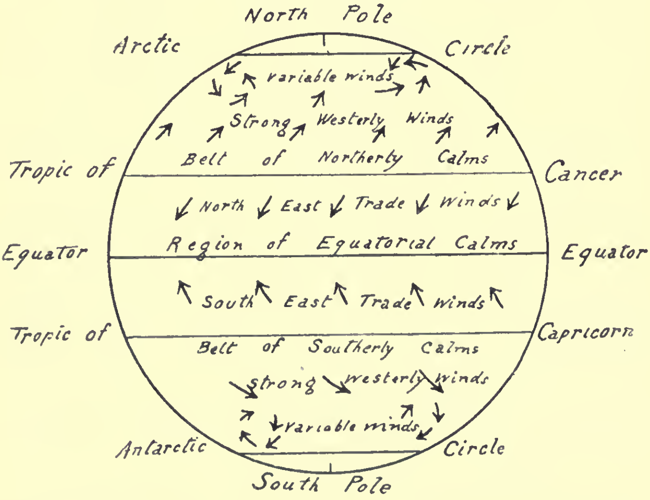


Diagram showing the movements of the winds over the surface of the earth damp air takes all the energy out of human beings, but it is splendid for vegetation of every kind.

As we pass from the equator, the rainfall becomes less and less, until when we are fairly in the trade-wind belt there is sometimes hardly any rain at all. We have already seen that the trade-winds of the Northern Hemisphere come from the north-east, and therefore what rain there is will fall mainly on the eastern coasts of continents. The western parts of countries in the trade-wind belt are very dry. The west of Mexico, the west of North Africa, the west of Arabia, and the west of India are all deserts.

The same is true of the trade-wind belts of the Southern Hemisphere. The west of central South America, the west of South Africa, and the west of Australia are also deserts. The eastern parts of certain countries in the trade-wind belt have a peculiar climate called a monsoon climate. In summer time the trade-winds cease, and steady winds blow in exactly the opposite direction. These winds are called monsoons, and they bring the welcome rains that make the monsoon lands so fertile. Monsoon countries, therefore, have wet summers and dry winters. The east of Africa, the east of India, southern China, and north-east Australia are good examples of areas with a monsoon type of climate.

A little north of the tropic of Cancer, that is, where the trade-wind belt gradually passes into the belt of westerlies, there are certain countries on the west of continents that enjoy a climate peculiar to themselves. The countries round the Mediterranean Sea have this kind of climate, and therefore it is called the Mediterranean type. The summers are very hot, and the winters are mild. The rain falls mainly in winter time. The summers are almost rainless. A peculiar type of vegetation is found in these countries which will be described later. In addition to the countries bordering the Mediterranean, other countries having the same kind of climate are California, Cape Town district, Chile, and Southern Australia.

When we come well into the belt of westerly winds we find a type of climate that is familiar to everybody in Britain. There are four well-marked seasons in the year. There is rain at intervals all the year round. The winters are fairly cold. Indeed in places far from the sea the winters are bitterly cold, and the summers are very hot.

Farther north around the pole there are only two seasons in the year, a short summer and a long, severe winter. There is daylight all the summer, and night all the winter. Terrible gales rage at times, and no human being exposed to these blizzards can live very long. In this respect the Antarctic is even worse than the Arctic.

We generally think of the world as divided into countries owned by certain nations. But we can think of it divided into natural regions according to certain natural features such as vegetation, or build, or climate. If we were to divide the world into natural regions according to climate, we should first think of three great divisions, namely, hot lands, temperate lands, and cold lands. Hot lands we could subdivide into rainy equatorial lands, dry western deserts, and eastern monsoon lands. The temperate regions we could again subdivide into Mediterranean lands, cool temperate lands (e.g. British Isles), and one or two other less important types. In this chapter we have already described the climates of these natural regions. It is a good exercise to take a map of the world, and try to arrange it in natural regions according to climate.

3. THE CHIEF PLANT BELTS OF THE WORLD

PART I

We know from looking at pictures that the vegetation of many foreign countries is quite different from that of our own. Certain kinds of plants are suited to hot countries, others to cold countries, others to dry countries, and others to wet countries. You must never forget that plants are living things. They eat, drink, and breathe; they struggle with other plants and the stronger kill the weaker; they migrate to other countries, and, when the conditions are favourable, they flourish and bring up large families just as human beings do. Thus we find that plants are adapted to their surroundings, and particularly to the climate in which they live.

Let us first very briefly look at some of the ways in which plants adapt themselves to climate. The water that a plant drinks is breathed into the air by its leaves. Trees that have plenty of water to drink are tall and have many thin leaves covered with breathing mouths. Their bark is thin and smooth, and also breathes freely. On the other hand the plants of dry regions have fewer and smaller leaves. The leaves are often covered with a thick, glossy skin, or with hairs, or with varnish, in order to prevent the water in the plant from evaporating. The bark is often thick and rough. The plant is able to store up water either in its thick leaves or in special water-bags. Some desert plants develop very long roots in order to search for water far below the surface. Plants that live in windy districts often grow umbrella-shaped in order to present a flat edge to the wind.

We shall now describe some of the most important types of vegetation found over the globe. We saw in the preceding chapter that the equatorial belt is hot and very rainy. This climate nourishes exceedingly dense tropical forests. The foliage is so thick that there is perpetual twilight on the ground. The trees are tall, and of very many different kinds. Great rope-like tangles of creepers stretch from one trunk to another and make it very difficult for travellers to cut a way through the forest. There is no marked difference in the seasons, and so at all times of the year we find some plants budding, some bursting into flower, some bearing fruit, and some shedding their leaves.

Hardly any animal life is to be seen on the dark and gloomy ground, but the upper surface of the forest teems with life. Insects of brilliant hues, birds with gaudy plumage, tree-frogs, snakes, lizards, monkeys, and many other tree-animals play among the large, brightly-coloured flowers of the trees. These animals, as a rule, never touch the ground in their lives. It is difficult for man to live in the tropical forests. If he makes a clearing he has to fight the plants which seem to spring up by magic, and threaten to smother his undertaking.

Immense forests of this kind, still unexplored, are found in the basin of the Amazon and in the Congo. Dense tropical forests also cover parts of Burma, Borneo, New Guinea, and Sumatra.

As we pass from the equator, the climate becomes less rainy, and the forests become less dense. The country is like a great park, with tall grass and scattered trees. The grass is often taller than a man, and is dry and dusty. The trees are scattered, or cluster in woods along hollows. Among the grass are shrubs, small trees, and prickly bushes. This type of country is called the savanna. It borders the tropical forests of Africa and South America, and is found also in Australia and other countries. It is the home of multitudes of large animals.

Tropical vegetation—A mangrove swamp

Most of the large African mammals—the antelope, the zebra, the giraffe, the elephant, the rhinoceros, the lion, and many others—are inhabitants of the savanna.

The savanna gradually passes into the semi-desert and then the desert. In the previous chapter we saw in what part of the world deserts are found. In the semi-deserts trees disappear, and their place is taken by thorny scrubs. Plant life becomes poorer until in the actual desert it disappears except in oases round wells. Naturally all desert plants must be able to withstand long droughts. They have few or no leaves in order not to breathe out moisture. Instead of leaves

Pine-apple plantation, Southern Rhodesia we see thorns and prickles as in the cactus plants that are sometimes seen in this country. Often the plants store up water in their thick, fleshy stems, or they have thick roots like enormous turnips or carrots in which they store food and water. These roots, as well as the plants themselves, are covered with a thick leathery skin in order to retain all moisture. The strange forms of desert plants are very striking. Some stand up like pillars, some are like cushions, and some like huge candelabra.

Deserts are not found in temperate countries, for the rainfall is never scanty enough. If there is not very much rain we find dry grass lands that are called steppes. These steppes cover enormous areas in east Russia and Siberia. The great prairies of America are true steppes. Steppes are vast, rolling plains covered with grass. In spring the grass is of a beautiful green colour, with here and there stretches of bright yellow buttercups and other flowers. The summer is always hot and dry, and the plants then take on a grey, withered look. The winter is bitterly cold.

A great many bulb plants grow among the grass of the steppes. In the summer these plants die down, yet they are able to live through the autumn and the long cold winter because of the food and water stored in their bulbs. When the light rains of spring come the bulbs grow very rapidly and soon the steppe is brilliant with their lovely flowers.

4. THE CHIEF PLANT BELTS OF THE WORLD

Part II

In a previous chapter we described a type of climate called the Mediterranean type, and suited to this kind of climate there is a Mediterranean type of vegetation. Most of the trees and shrubs are evergreen. They do not drop their leaves in winter, because the rain falls mainly in winter. The summers are very dry, and so the plants are suited to withstand long spells of dry weather. The leaves are thick and leathery. They are often covered with hairs or varnish. The trees have thick bark. It is the thick bark of one of the Mediterranean trees (an evergreen oak) that gives us cork. Prickly shrubs take the place of grass.

The Mediterranean lands are noted for fruit. The grape, the plum, the orange, the olive, the fig, the peach, the almond, and the pomegranate all grow to perfection. Plants with underground bulbs are very common. In spring the land is beautiful with irises, orchids, tulips, narcissi, and many other lovely flowers. A less beautiful but more useful bulb plant is the onion, which is typical of Mediterranean lands. The summers are too hot and dusty to be pleasant. The country looks bare and dry in summer. Remember that all the plants mentioned flourish not only in the countries surrounding the Mediterranean but in all lands that have a Mediterranean type of climate.

The vegetation of cool temperate lands is familiar to us all, for it is seen in the British Isles. The chief trees are the oak, the ash, the beech, the maple, the elm, the lime, the rowan, and many others. These trees all shed their leaves in winter. This is done for two reasons. The winters are too cold for growth, and therefore the life of the tree is stopped for a time and so its leaves are useless. Again when the ground is frozen no water can be drawn from it, and if the leaves were kept, and went on breathing out water, the tree would die completely from want of water.

Birches in Sherwood Forest

In former times most of Britain was covered by forests, but they have been cleared in order to grow crops of different kinds. In the northern part of the cool, temperate belt we find cone-bearing forests. The chief trees are the pine, the fir, the larch, and the spruce. With them is found the birch, the hardiest of all leaf-shedding trees.

It is interesting to note how well the cone-bearing trees are adapted to their surroundings. The trees are broad at the base, and taper upwards. They are thus able to resist the violent winds of the north, and also to bear more easily the load of snow in winter. Throughout the long winter they cannot obtain water from the ground, and are therefore protected against drought. Thus their leaves are short and needle-shaped, and have a thick, tough skin. They store up in the wood supplies of food. Their life is not nearly so vigorous as that of more luxuriant trees. It has been said of them, "They spend little, earn little, and hoard much; they lead a slow, thrifty kind of life." Enormous forests of cone-bearing trees are found in Norway, Sweden, Russia, Germany, and Canada.

As we go farther north the trees become fewer, and at last cease. We are now in the tundra. A dreary expanse of barren land stretches on all sides. Rolling plains with stunted bushes are crossed by numerous streams, and dotted over with marshes and lakes. For eight months of the year the ground is frozen. About the middle of July the plants burst into life as if by magic. Brilliant flowers appear suddenly. Evergreen berry-bushes bear their fruit. Wet parts are white with the cotton-grass. In drier parts, mosses, lichens, and tiny plants with leathery leaves are found. Two months later, growth ceases as quickly as it began, for the grip of the terrible winter is beginning to be felt. The tundra is best seen in the north of Siberia and the north of Canada. North of the tundra we reach the icy deserts of the Arctic regions.

5. HOW ANIMALS ARE SUITED TO THEIR SURROUNDINGS

Animals are not forced to stay in one place like plants. Therefore they are not so dependent on their surroundings as plants, for if their surroundings are unsuitable they can change them to some extent. The appearance and habits of animals are, therefore, not so strongly modified by their conditions of life as in the case of plants, yet it is quite easy to see that on the whole the natural regions of the world are inhabited by animals that have been modified to suit the climate and other natural features of their home. For example, nearly all the inhabitants of tropical forests are flying or climbing animals, while the animals of wide plains, including even the birds, are generally swift runners. In this chapter we shall describe the most typical animals of some of the great natural regions of the world, and show how they have been adapted to their surroundings.

In the Arctic regions the animals are confined to the sea coasts, because part or all of their food comes from the sea. They are nearly all migratory, for few animals could stand the rigors of an Arctic winter. One curious form that does not migrate is the musk-ox. The famous explorer Peary tells us how he was once on the point of death by starvation, when his life was saved by coming across a herd of these strange creatures in the extreme north of Greenland. The musk-ox is well protected by its shaggy coat; and it scrapes away the snow to obtain the moss that forms its food.

The wolf, the Eskimo-dog, and the Arctic fox are other forms that are well adapted to live in these cold regions. The polar-bear is never far from the sea, for it feeds mainly on seals and walrus. The stoat's fur becomes white in winter, and is then much prized by hunters, for it makes the valuable fur called ermine. There are many birds, all of which travel south in winter.

In the tundra the reindeer is the most typical animal. In winter it finds its favourite food, reindeer moss, by scraping away the snow. In summer mosquitoes make life unbearable. A traveller in the Klondike tells us that some of the gold-seekers there, men accustomed to perils and hardships of all kinds, burst into tears owing to the never-ending agony inflicted by millions of mosquitoes. The Lapps always carry a pot of tar with them, with which they smear their faces every now and then.

In the belt of cone-bearing trees the animals are less migratory than those of the tundra, for the forest is a better refuge in winter. It affords protection from the cold, and gives nuts, leaves, and berries for food. It has two kinds of inhabitants, true forest dwellers like the squirrel, the lynx, and the dormouse, and animals such as the wolf and the fox that are not specially adapted to forest life, but that come for shelter. Like the tundra the coniferous forests contain many berry-bushes that are very valuable for food.

The deer tribe are the most typical inhabitants of these regions. The trees and undergrowth are not so dense as in tropical forests, and therefore big and horned animals can move about freely. Bears are

Red deer in the Highlands of Scotland

frequently found. They are good climbers, and live on nuts, seeds, honey, and insects. Birds are more abundant than in tropical forests. Their eggs are not so often plundered, for monkeys are absent and snakes are few.

In the steppe in summer time there is plenty of plant food, but in winter it is scarce and the climate then is very cold. As a rule, therefore, the animals are migratory and also swift runners. They tend to go about in herds. The steppe is exposed to drought, famine, terrible storms, and bitterly cold winds, and these kill off many animals. To counteract this, steppe animals have very many young, and so the numbers are kept up. Many small animals burrow under the ground or hibernate, and so escape the terrors of winter.

There are numerous birds, many of which are swift runners. In the steppes of North America there used to be millions of bison. When South America was discovered it contained very few large, hoofed animals. There were no horses, cattle, sheep, or antelopes. Now there are enormous numbers of cattle, sheep, and horses, showing how suitable the steppe is for such animals. Some of the common animals of the Asiatic steppe are the wild horse, the wild ass, the antelope, and the two-humped camel. Steppe animals are generally of a dull tawny colour, which matches the colour of the steppe, and renders the animals less easily seen. The grass-eaters are swift; the flesh-eaters are cunning and strong.

In the tropical forest animals are not abundant. Plants have the upper hand here. The traveller may march for days and see only insects and reptiles. This results from the fact that food plants are scarce. Even the few native tribes seem generally to be in a half-starved condition. There is no winter in these regions, and therefore fruits are ripe all the year round. This explains the presence of monkeys, which are mainly fruit-eaters, and parrots, which eat fruits and seeds. Such animals could not live in countries with winters.

North American bison

There are many reptiles, for their eggs can be hatched by the heat of the sun. Many of the forms are tree-dwellers all their lives and never touch the ground. Some of the mammals have developed organs that have some resemblance to wings or parachutes.

By spreading out these organs they can leap long distances from tree to tree. For example, there are flying squirrels, flying frogs, and flying lizards. Some animals (sloths for example) have their fingers and toes converted into hooks, and hang downwards from branches. Many animals have both fore and hind paws adapted to grasping. The thumbs and great toes oppose the other fingers and toes. The tails of some are prehensile, that is, they can be used for grasping branches.

The leopard and the jaguar are at home in forests, for they can run up trees with ease. The latter animal preys largely on monkeys. We do not find many hoofed animals; they are more adapted to plains. Elephants are forest dwellers, partly because they find food there, partly because they love the shade. The birds are brightly coloured, and include the parrot, the toucan, and the most brilliantly-plumaged bird in the world, the bird of paradise of the New Guinea forests. Reptiles reach a huge size. Crocodiles infest river-fords and drinking places, and giant boa-constrictors and anacondas coil among the trees.

Bordering deserts we find first semi-desert scrubs and then savannas. In many respects savannas resemble steppes. They are partly wooded, but contain also wide plains. They differ from steppes in being tropical, and therefore have not the severe winters of the steppe. Savanna animals, therefore, resemble steppe dwellers in many ways, but their number and variety are much greater. Hoofed animals are most typical. Hoofs are best for quick running. Some savanna animals are just developing hoofs, for the number of toes is reduced.

The number and diverse kinds of antelopes are remarkable. Some rely for safety on their speed, some on their formidable horns. Buffaloes are common, and unless old or wounded are given a wide berth even by the lion. The giraffe prefers the thorny semi-desert, for it can go for months without drinking. Its long legs and lengthy neck give it a great height from which it has a very wide range of vision. This is a valuable means of defence. The lion inhabits savannas and semi-deserts, its uniform, tawny colour preventing it from being easily seen. The hyena is not far away, for it devours the remains of the lion's feast. Other well-known savanna dwellers are the rhinoceros, the zebra, and the wild ass. There is a well-known conundrum that asks, "Why does a donkey eat thistles?" The scientific answer is that its ancestor, the wild ass, often lived in semi-deserts, and was accustomed to dry and prickly food.

The birds are very frequently runners rather than fliers. The ostrich, like the giraffe, has long legs and a long neck, and can therefore see its enemies from afar. It has only two toes, and can therefore run faster than if it had a fully-clawed foot. The rhea of South America and the emu of the Australian savanna are like ostriches in many ways. In the Australian savanna we find the kangaroo and other pouched animals.

The young of savanna animals are generally strong and active very soon after birth. If not, then they may be carried in pouches like the young of the kangaroo. Many of the small animals live in burrows. Jumping animals are common, from those the size of a mouse to the giant kangaroo. They cover the ground at an amazing speed. To sum up, then, we find that savanna and semi-desert animals protect themselves in various ways, by running powers, by horns, by burrowing, by wide range of vision, and by colour. In all these ways they have adapted themselves to their surroundings.

6. LIFE IN MANY LANDS

In former chapters we saw how we could divide the world into natural regions according to the climate, and how the plants and animals were adapted to the regions in which they live. In this chapter we shall show how the life of man is influenced by his surroundings.

In the dense forests of the equator plant life is so active that man has difficulty in fighting it. The inhabitants of these forests are few in number. They wander about getting a hard living by hunting. Since they are hunters they do not build permanent houses. A thatch of leaves and branches to keep off the rain is all that is needed by the natives. They eat snakes, frogs, and roots.

Some tribes use a long blow-pipe with poisoned darts for bringing down an occasional bird or monkey. The people are very small in size, and very low in the scale of intelligence. They wander about practically naked, for there is no winter in these lands.

In very dry lands also, life is very hard, in this case on account of the scarcity of vegetation. The desert itself cannot support human life, but at nearly every oasis there is to be found a village. The lives of travellers across the desert depend on their power to cross from one oasis to another before their food and drink give out.

A camel postman on the shores of the Red Sea
(*He is starting for a hundred mile ride and is armed with sword and shield*)

This necessity for rapid motion explains why the Arabs have reared such fine horses. Even more useful than the horse is the camel, for it can go long distances without food or water. Its hump is a food-store, and it carries in its stomach enough water for several days. Those who cross the desert generally form caravans for protection, for the desert affords shelter to roving bands of robbers. The dress of the desert dwellers is suited to the climate. It always includes a large head dress or turban to protect the head from the sun. Some desert tribes also wear a cloth veil. Since it would be dangerous to move the turban, in order to show respect, desert races remove their sandals. Feet-washing, therefore, becomes a solemn ceremony as we read in the Bible.

There is little wood, and so the houses are built of mud or stone. The walls are thick, and there are hardly any windows, for the sun is an enemy. Many of the greatest wars and movements in history have been due to the gradual changing of fairly dry lands into actual deserts, which caused whole nations to wander into other lands, and try to seize them by force.

We have seen something of the life men lead in very wet countries and in very dry countries. Let us glance next at the dwellers in very cold lands. The Eskimos live in the Arctic regions where there are snow and ice almost all the year round. The Eskimo is fat in order to withstand the cold. He never washes himself, for fresh water can only be obtained by melting ice. His food comes almost entirely from the sea. Seal meat is the most common food. He also likes fish, whale blubber, and bear meat when he can get it. Plainly he must live by hunting, for no vegetable food can be grown.

He is never found far inland, for almost all his food comes from the sea. For this reason, too, he is a very skilful and daring sailor. In his light, skin skiff he defies the waves, and in it he even dares to attack the great walrus with his rude harpoons. The seal supplies him with food, clothing, light, boat, and many tools and other useful things.

In winter the Eskimo lives in a house built of slabs of hard snow. He enters the house by crawling on hands and knees along a curved tunnel. It is curved to keep out the wind. The inside is warmed and lit by a stone lamp in which burns a moss wick floating in seal-oil. In summer he moves about from place to place, for a hunter can never settle down for long in one spot. His carriage is a sledge drawn by a team of strong, ferocious Eskimo dogs. He must use dogs, because no plant-eating animal can live in the frozen north. The Eskimo is not only a brave man, but kind, good-tempered, generally honest, and in many ways wonderfully clever.

Dwellers in the great steppes of Asia lead a different mode of life from any yet described. The climate is too dry for ordinary farming, but the great plains clothed with somewhat scanty grass are very suitable for the rearing of live stock. Horses, sheep, goats, and sometimes camels, are the chief animals, for the grass is hardly rich enough for large herds of cattle. When the fodder at one place gets eaten up the animals are driven to another grazing ground. The people, therefore, are nomads, that is, they are continually wandering from place to place. Their animals are their whole wealth. Their food consists almost entirely of meat, milk, butter, and cheese. Their clothing is woven from wool or hair. Their tents are of skin or woven of hair. Even their bottles and other utensils are of skin.

Since there is no settled life there can be no villages or towns and no real nation. The people are divided into families, and each family leads its own life independent of all the others. The head of each family expects instant obedience from his children and grandchildren. The larger the family the more powerful is the chief, and this is why we find among these people the custom of having many wives and many children. We find many interesting accounts of the life of these nomads in the Bible. It is plain that their unsettled life prevents them from ever being highly civilised, but on the other hand they love freedom, and are brave and hospitable.

India, China, and Japan are the chief "monsoon" countries, and since the climate is alike in all three countries the modes of life are also similar in many ways. The rain falls in summer when the weather is warm. Since heat and moisture are very good for vegetation it follows that monsoon lands are generally very fertile. Agriculture is therefore the chief industry, and that is why the people of India, China, and Japan are nearly all engaged in farming. Since the land is very fertile the population is very dense.

There are far more people in India and China than in all the countries of Europe. In one respect the people of monsoon lands are very different from the steppe dwellers just described. The people of monsoon countries live a settled life, and therefore have an opportunity of becoming highly civilised.

When our ancestors were rude savages the Chinese were a learned and civilised nation. But Chinese learning never got beyond a certain stage. In the greater part of the country they are the same now as they were two thousand years ago, and until just lately they have hated anything new. Is there any geographical reason why this should be so? If you look at China on the map, you will see that on the east it has the Pacific Ocean, on the south high mountains, on the west the greatest plateau in the world, and on the north-west dry plains and mountain ranges. China is surrounded by natural barriers, and the people until recently were quite cut off from the rest of the world. Thus they had no chance of seeing anything new, and they got into the habit of thinking that their customs were the only good ones. For this reason they have not progressed.

Rice, cotton, and silk are among the most important crops of monsoon lands. The Indians, Chinese, and Japanese live chiefly on rice. The clothing of the poorer classes is cotton, and of the richer silk. Japan is an island country, and therefore fish is an important article of food to the Japanese. The country is subject to terrible earthquakes, and this has an effect on the houses. They are low, and are generally built of some very light material. A wooden framework, paper partitions, and straw thatch, are most common. It is easy to see, therefore, why fires are so destructive in Japan.

Nowadays the Japanese are much more enterprising than the Chinese. The fact that Japan is a group of islands has probably a lot to do with this. Island nations are nearly always self-reliant and full of enterprise.

The vigour of island nations seems to be due to the fact that they adopt a sea-life, and this means a continual training in courage and self-reliance. Sea-going nations such as the British, the Dutch, the Japanese, the Danes, the ancient Greeks, are nearly always brave and enterprising.

Marine fishing village, New Guinea

The Polynesians of the Pacific Ocean are a good example of island inhabitants. In appearance they are very tall, strong, and well-made. In this respect they are much finer than most Europeans. Both men and women are handsome, and have very beautiful eyes and teeth. They are the finest swimmers known, and do not fear even single-handed to attack a shark. They are kind, hospitable, and good-tempered.

Some people say they are lazy, because they do not work hard, but they have no reason for working hard, because their wants are few and easily supplied by the fertile soil. Their food is chiefly fish and vegetables. Their worst feature was the practice they used to have of eating human flesh. This is probably accounted for partly by a craving for flesh-food arising from their purely vegetable and fish diet. They were rather too fond of fighting with neighbouring tribes. This was due to their island home. When the population became too large for an island they were forced to try to obtain land in some other island. Needless to say they are excellent sailors, and even gave the early explorers rough maps of the surrounding ocean and islands. Unfortunately this fine race is rapidly dying out.

PART II. THE BRITISH ISLES

1. OUR NATIVE LAND AND THE SEAS AROUND IT

Long before there were any men living in this country the climate was very cold. It was as cold here then as it is in parts of the arctic regions at the present time. Instead of green fields and yellow cornlands and waving trees there was nothing but ice and snow. In the mountainous parts of Britain great glaciers came creeping, creeping very slowly down the valleys, and the grooves and scratches made by them on the hard rocks can be seen to this day. As we shall see later when we come to speak of the scenery of Scotland or Wales many striking features are due to the former presence of a thick mantle of snow and ice over Britain.

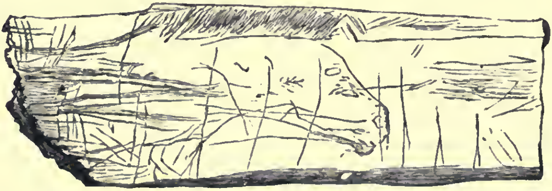
At this time and even after the ice melted there was no English Channel. Britain was joined to the Continent by land. Most of the North Sea was dry land, and the river Thames was probably a tributary of the Rhine. It was at this time that the plants and animals now found in Britain came here from the Continent and peopled the desert left at the close of the Ice Age. Almost the same kinds of plants and animals are found in Britain as on the Continent of Europe except that there are fewer kinds in Britain. This shows that the land connection was broken and the English Channel formed before all the Continental forms of life had time to migrate to this country.

The belief that Britain was once joined to the Continent is supported by the fact that the nature of the rocks on both sides of the Channel is exactly the same. For example, Devon and Cornwall are composed of hard rugged rocks quite similar to those of Brittany. The coast of Sussex and Kent is bordered by white chalk cliffs which are repeated across the Channel along the shores of northern France. The low, flat fen lands round the Wash correspond to the plains of Holland, and, finally, northern Scotland is similar in many respects to Norway.

Among the animals that crossed from Europe by land was man. The earliest men in Britain were rude savages using rough stone tools and weapons. From this fact they are said to belong to the Old Stone Age. They were not tall, but were very strong and were splendid hunters and fighters. A kind of big, hairy elephant called the mammoth lived in this country in these times, and the early inhabitants were such brave and skilful hunters that they actually attacked the mammoth with their rude weapons. An elephant is a dangerous enemy to a man armed even with a modern gun, so you can imagine how fearless our savage forefathers were in hunting the mammoth with bows and arrows and stone axes.

It is a strange thing that many savage races that are very degraded in most things are yet clever artists. This was the case with the earliest inhabitants of Britain. Some of their drawings have been found representing such things as hunting scenes, and they are remarkably well done. The illustration shows a drawing of a horse's head found scratched in a cave in Derbyshire.

After the men of the Old Stone Age had been in Britain for some time, the land gradually sank and Britain became a group of islands much the same in appearance as they are to-day. This was an event of very great importance, and we must, therefore, consider more carefully the position of the British Isles and see what advantages or disadvantages this position has. Shakespeare indicates one advantage when he speaks of Britain as



Drawing of a horse's head belonging to the Old Stone Age

> "This precious stone set in the silver sea,
> Which serves it in the office of a wall,
> Or as a moat defensive to a house,
> Against the envy of less happier lands."

There is no need to keep up a huge standing army as Germany, Russia, and France have to do, and so more people are set free for peaceful occupations which add to the wealth of the country. Again, Britain has good harbours all round its coasts, and no part of the country is far from the sea. Goods can therefore be carried to a large extent by sea, and this is a distinct advantage, for sea-carriage is much cheaper than railway-carriage.

If you look at a map you see that the British Isles are situated to the extreme west of Europe. In early times this was not a good situation, for most of the commerce of Europe was carried on along the shores of the Mediterranean Sea. Britain was out of the main trade routes; it was on the edge of the world so to speak. But nowadays trade with America has become so vast that the Atlantic Ocean carries most of the world's commerce, and the position of Britain on the shores of the Atlantic Ocean and between America and the great countries of Europe is, therefore, exceptionally favourable.

Again, Britain is favoured by its climate. It is situated in the temperate belt, where it is neither too hot nor too cold. Too warm a climate is not good for a nation, for the inhabitants sometimes tend to become lazy and wasteful, while the people of a country with a fairly cold winter are forced to make provision for the future, and are generally intelligent and energetic. On the other hand, too cold a climate is not good either, for the people are continually struggling against poverty or even starvation, and seldom become highly civilised. The winters in our country are not severe enough to put a stop to outdoor work. Nor are the rivers and the harbours frozen up and commerce brought to a standstill as in many other lands.

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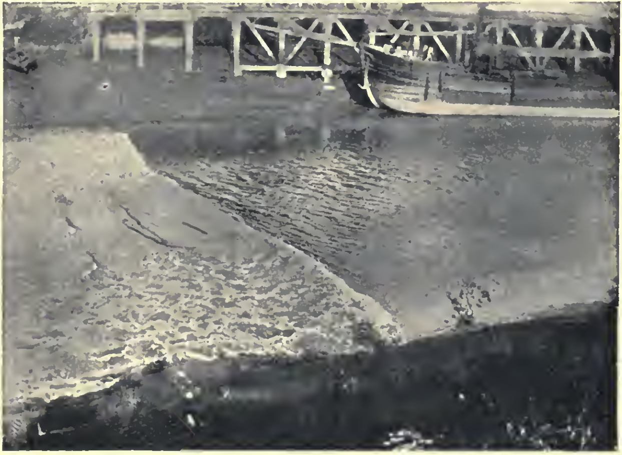
Now let us glance for a moment at the seas around Britain. For the most part they are very shallow. We see from the map that all the North Sea is shallow except a narrow and deep channel that runs round the south of Norway. With this exception it is not till we are well west of the British Isles that the sea-bottom begins to slope down to the great depths of the Atlantic Ocean. Because of this fact Britain is said to rise from a *continental shelf*.



The bore of the Parrett at Bridgwater

The shallowness of the British Seas is important in more ways than one. Fish like to feed on banks over which the water is not very deep, and so we find that the Dogger Bank and the other banks of the North Sea form some of the most valuable fishing grounds in the world. Again, the tides are strongly influenced by the depth of the water. In the open ocean the rise and fall of the tides are very slight, but shallow water makes the rise and fall much greater, the difference between high tide and low tide being frequently as much as twenty feet. Large ships are thus enabled to come safely into harbour at high tide. Sometimes the tide comes in rapidly as a distinct wave or bore. This is well shown in the photograph of the bore of the Parrett, in Somersetshire. A bore is formed when the tidal waters are moving into a funnel-shaped estuary which contracts the tidal wave more and more, and this causes it to become higher and higher until it forms a distinct bore.

By the use of your map you should become familiar with the most important seas and channels round the British Isles. Find the Straits of Dover and the English Channel. Notice how all the four countries that make up Britain are grouped round the Irish Sea, which thus forms an ideal trading highway between the four nations. Just as a house has a front door and a back door so the Irish Sea has two entrances, St George's Channel and the North Channel. This is very convenient for trade, and in the event of a naval war it might be of the greatest importance.

Every day the Straits of Dover and the Irish Sea are crossed by fine steamers that sail from many different ports of Britain. In many cases these boats are fitted with turbine engines and are very speedy. If you assume that they go at twenty miles an hour you will not be far wrong, and then by measuring the distance on the map from one port to the opposite one you can easily find the time required for the voyage. When we come to treat each country in Britain in detail we shall mention the chief ports from which these steamers sail.

Many parts of our coasts are so rocky and dangerous that lighthouses have to be built at these places to warn sailors of their danger. There are over 900 lighthouses round the coasts of Britain, some of them on lonely rocks far from land. Many an anxious captain must feel relieved when he sees the welcome flashes of some well-known lighthouse. In storms the waves often dash right over the very top of the tower. In foggy weather the light is of little use for it cannot penetrate the fog. Fog-horns and bells are then used to sound a warning to the passing ships. Some lighthouses burn paraffin oil, some gas, and some use electric light. Perhaps the best known of all British lighthouses is the famous Eddystone lighthouse off Plymouth. It is the fourth lighthouse built on this spot. The base of the third one is still to be seen beside it. Navigation lights are placed not only on lonely and dangerous points; they are also used to mark routes and the dangerous spots in them.

2. THE BUILD OF BRITAIN

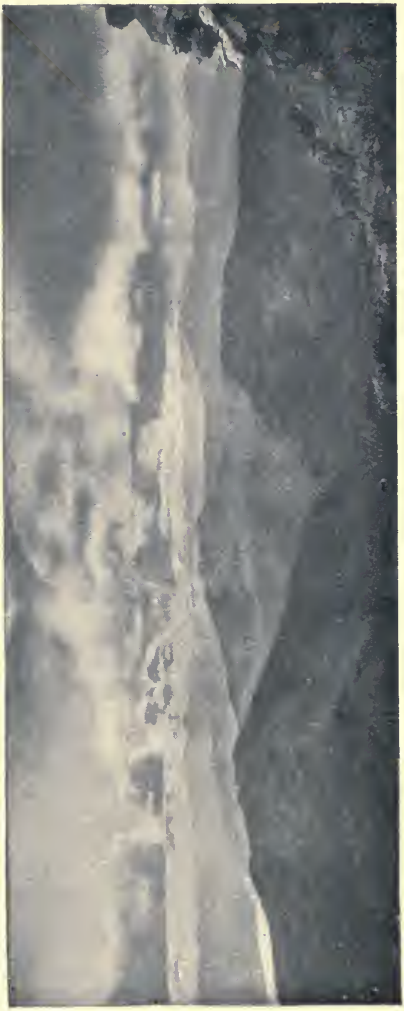
You are already pretty familiar with maps of various countries. You know that a map tells you the size and shape of a country, and the positions of rivers, mountains, towns, and other features. An immense amount of information can be obtained from maps if they are carefully studied. In the first place they tell us the direction in which places lie. The top of the map nearly always represents the north, and from this we can tell in what direction any place on the map lies. For example, turn to a map of the British Isles. Now suppose we are situated in Birmingham. In what direction does Yarmouth lie? Name the direction in which each of the following towns lies—London, Newcastle, Swansea, Belfast. Be sure that you are able to stand up in the class-room and point in the actual directions you have named.

From a map also we are able to tell the distance between places and the size of countries. This is done by making use of the scale of miles that is always found on a map. Turn again to the map and try the following little problems. How far is it from your own town or village to London, Edinburgh, and Dublin? What is the distance between Dover and Calais? What is the length of the British Isles between Cape Wrath and Land's End? The part of England farthest from the sea is a little north-east of Birmingham. How many miles is this part of England from the sea? Not only can we measure straight lines, but if we had a piece of thread we could measure irregular lines such as the course of a river or a railway. We should lay the thread along the line to be measured, then straighten it, and use the scale of miles to find the length of the thread.

Among the most useful things that a map can tell us is information about the build of the country, that is, what parts are mountainous, what parts are flat, and how high any part of the country is. The sea-level is always taken as the base from which we reckon our heights. When we say that Snowdon is 3570 feet high we do not mean that the top of the mountain is 3570 feet above the foot, but that the top is 3570 feet above the level of the sea. But you may say that the level of the sea is always changing ; the tide is sometimes high, sometimes low This is quite true, and so we take *mean sea level* as our starting point, that is, the mean level of the sea over a long period of years.

A physical map in your atlas will show you the build of the British Isles. In Great Britain there are three great masses of high ground and a number of smaller mountainous areas. Most of the northern half of Scotland is mountainous, and this area is called the Scottish Highlands. Again, high ground is found in the south of Scotland, and this hilly area extends over the border into England and runs down the centre of England as far as Derbyshire. The part of this hilly area that lies in Scotland is called the Southern Uplands, and the English part is called the Pennine Uplands. The hilly district that lies west of the Pennines and is joined to them by a narrow neck forms the mountainous Lake District. The third great mass of high land is composed of the mountains of Wales. The mountains of Ireland do not form such large masses, but are found at intervals round the borders of the country leaving the middle as a flat plain.

If you were to climb to the top of Snowdon or Ben Nevis you would see no regular lines of mountains. On all sides would appear a confused sea of mountain peaks arranged in no definite order. The photograph on p. 43 taken from the top of a mountain in the Scottish Highlands shows very well the nature of the view you would have.



View from the summit of Ben Lawers

In every direction as far as the eye could reach you would see only mountains and valleys. You must think of these areas as being originally plateaus or enormous slabs of rock, the softer parts of which have been carved out by rain, rivers, and glaciers, leaving the harder parts standing up as mountains.

There are two other kinds of hills that are found frequently in this country. In many places there rises suddenly from the surrounding ground a steep high rock, the summit of which is often crowned by an ancient castle. These hills are remnants of old volcanoes and we shall speak of them more fully when we deal with the ancient volcanoes of Scotland. Edinburgh Rock is a good example. Again in the south and east of England there are long ridges rising sometimes seven or eight hundred feet above the sea. These ridges have nearly always a gentle slope on one side and a steep slope on the other side; they are formed by long bands of rock harder than the surrounding rocks. The hard bands are not worn away so quickly by the weather and therefore stand up as hill ridges. The Chiltern Hills, the Cotswold Hills, and the North and South Downs are examples of hills of this kind.

It is difficult to make roads or railways over a hilly district, and so the mountainous parts of Britain are not nearly so well supplied with these means of communication as the flat parts of our country. Remember always that mountains form barriers to trade and to communication. If a road or a railway must be made through the hills then the engineers will look for some valley that runs as far as possible through the mountains. Therefore it is the *lowest* parts of a mountainous district that are most important, and in learning geography we should give much more attention to the main valleys than to the names of the mountains. Suppose for example we are learning about the Pennine Uplands. On the map you will find high mountains called Cross Fell and Ingleborough. The mountains are of little importance. But you will also see two valleys cutting right across the Pennines, and called the Aire Gap and the Tyne Gap. These are of very great importance, because they form easy routes by which one may get from one side of the hills to the other. Therefore roads and railways have been made through these routes and much traffic passes along them.

If you were to rise high above the surface of the ground in a balloon or an aeroplane you would find that the air would become distinctly colder. The same thing occurs if you rise much above sea-level by going to the mountainous parts of a country. It has been found, too, that places among the hills have a much greater rainfall than places near the sea or on flat ground. Since the mountainous parts of Britain are colder and rainier than the low-lying parts it follows that they will be not nearly so good for farming. The soil, too, is generally very thin and poor and so all the finest farms of this country are situated on the plains. Sheep may be kept on the mountains, or they may be used only for rearing game for shooting.

From what we have said it will be clear that there will be far fewer people living in the hilly parts of

Britain than on the plains. One might walk for many miles without ever seeing a house or a person. So in the days

> "Of old unhappy far off things
> And battles long ago"

the mountainous parts of Britain were the home of the people who were defeated in war. The ancient Britons fled to these districts before the march of the Romans. The Scottish highlanders and the Welsh were driven into the heart of the hills by the English. The victors seldom followed them there, for not only was it very difficult to take a large army safely through the mountains, but the land even if conquered would be of little value. And so we find to this day in the mountainous parts of Britain people quite different in race, customs, and language from those dwelling in the lowlands. To sum up then we may say that the highlands of Britain differ from the lowlands in scenery, in climate, in vegetation, in industries, and in people.

3. PRODUCTIONS OF THE BRITISH ISLES

The vegetation of the British Isles depends very largely on the climate. In the last chapter we saw that the mountainous parts of Britain are much colder, much more rainy, and much more exposed to wind than the lowlands. As a result neither trees nor crops can be grown on ground that is far above sea-level. The hilly parts of this country then are mostly uncultivated.

They can be used only for rearing a hardy breed of mountain sheep, or perhaps they may be rented to wealthy people for shooting game. Besides the mountainous parts there are stretches of boggy or sandy ground that are not cultivated. The proportion of ground available for farming is much larger in England and Ireland than it is in Scotland. In the two former countries about three-quarters of the land can be used for growing crops or at least for feeding cattle, while in Scotland only about one-quarter of the land can be used in this way.

The chief grain crops grown in the British Isles are oats, wheat, and barley. Wheat needs a hot dry summer to ripen properly. Now you probably know from an earlier book that the south-east of England has the hottest and driest summers of any part of Britain, and so we are not surprised to find that the south-east of England is the district where most wheat is grown. We do not grow nearly as much wheat now as we once did. Thirty years ago the wheat crop of the British Isles was nearly double what it is now. This is due to the fact that we can now obtain wheat very cheaply from abroad, and every year we have to import immense quantities of grain and flour. The chief countries sending us grain are the United States, the Argentine Republic, Russia, Canada, India, and Australia. Find all these places on a map and you will notice that our bread is made from wheat grown in all parts of the world. Every month of the year there are ripe, golden fields of wheat in some corner of the globe awaiting the reaper.

Oats can stand cold and wet weather better than wheat, and are therefore much more commonly grown in some parts of our country. In parts of Scotland and Ireland oats are the only grain that is cultivated. Barley can be grown almost anywhere from the polar

A Worcestershire hop-garden

regions to the tropics. In Britain not very much is used for food. Most of it is sold by the farmers to brewers and distillers who make beer and whisky from it. Turnips and potatoes are the most important of the other crops. Ireland grows more potatoes than Scotland and England put together.

Of the less important crops flax is confined almost entirely to the north-east of Ireland. So much linen is made in this district that large quantities of flax have to be brought from abroad, mainly from Russia. Hops are grown chiefly in the south-east of England. Kent, Hereford, Worcester, and Devonshire are noted for their fruit. The basin of the Wye near the border of Wales is very sunny and dry, and so fine orchards are found in this district also. In Scotland the middle part of the valley of the Clyde is one continuous fruit garden.

The hilly parts of our country are too cold and rainy for ordinary crops to ripen, but there is often enough grass on the hillsides to feed sheep. This is the reason why we find most sheep in hilly districts like the Downs of Kent, the Cotswold Hills, the Chiltern Hills, Wales, and the Cheviot Hills. Cattle, however, need much thicker and richer pastures, and so they cannot be reared on the hills. That is why we find most cattle in lowland counties, particularly in the rainy, western lowlands where the grass grows thickest. Cattle-rearing is specially important in Ireland, and in the counties of Cheshire, Somerset, Pembroke, Ayr, Renfrew, and Wigtown. Pick out all these places on the map. You see that they are all in the west, and we have just seen why that should be the case.

The number of fishermen in Britain is naturally much greater than in most other countries. The inhabitants of islands nearly always tend to become good sailors and good fishermen. In addition, you will remember that one of the finest fishing grounds of the world lies opposite the eastern shores of Great Britain. Certain kinds of fish, such as the sole and the flounder, live near the bottom of the sea, while other kinds, for example the herring and the mackerel, live near the surface. The former kinds are caught by trawlers which drag their nets along the bottom. The boats that catch the surface fish are called drifters. They set their nets just below the surface of the sea. The number of fish caught by the hook and line is comparatively small. It is a fine sight to see the fishing boats standing out to sea.

Fishing fleet going out, Aberdeen

In some fleets there are hundreds of vessels, and when they set sail just as the sun is sinking, not only does one admire the picturesque scene, but one thinks of the courage and strength and industry shown by the fishermen every day of their lives. Every year hundreds of thousands of tons of fish are caught by British boats, and the value of the catch amounts to many million pounds. Herrings form the most valuable fish caught, and haddock and cod are next in importance.

4. BRITISH TRADE

One of the chief differences between savage and civilised peoples is that the latter trade with all parts of the world, while savage people use for food and clothing and houses and ornaments only those things that are obtained in their own country. Whenever a nation becomes civilised it starts trading with other nations in order to obtain goods that cannot be procured at home; and British boys and girls are dependent on far-off lands for the most common necessities of life. It is wonderful to think that men are toiling in all parts of the world, and that great ships are sailing over every ocean to bring to us the things we like.

Let us take for example the most common articles of food on the breakfast table. It seems the simplest thing in the world to go to the nearest grocer's shop and buy what we want, but think what labour has been spent before the food reached the grocer. In order that you may have your breakfast, ships must sail first of all from

France and Denmark and Spain. Others must come from places much farther away even than these. Part of your breakfast comes from India, part from the United States, another portion from South America, another from Canada, and the rest from the West Indies. To-morrow morning when you sit down to your first meal give a thought to the many strange countries that provide your food, and remember that not even a very rich man in the olden times could have a meal like yours.

Your porridge may have been made from oats grown in this country, but it is much more likely that the oats came from a foreign land, Russia perhaps, or Argentina in South America. Your tea probably came partly from India and partly from China. It was sweetened by sugar from canes that once waved in the warm wind and under the brilliant, blue sky of the West Indies. Your coffee most likely came from Brazil, which produces more than any other country. Your bread may have been once golden grain in America or India or Australia. A large share of the butter used in Britain comes from Denmark.

Now think of other things commonly seen on the breakfast table such as eggs, bacon, marmalade, and try to find out if we bring these things from foreign countries. If now you find all these countries on a map of the world it will help you to understand how wonderful the commerce of the world is, and how even the most common article may have come from a far-off land, and have been handled by many strange people before it reaches this country.

Let us now take up in an orderly fashion a few of the most important things that are imported from foreign lands, and see from what countries they come. The first thing to notice is that by far the largest share of our imports consists of raw material, while our exports are chiefly manufactured articles. Most of our imports consist either of food or of materials to be used in our factories.

Grain and meat are the chief foodstuffs imported, and we have already mentioned the countries that send us the largest supplies of grain. Foreign meat comes largely from America, Australia, and New Zealand. In North America both Canada and the United States send cattle and meat to Britain, while Argentina is the chief South American country. Nearly all the great meat-extract firms of Europe have cattle ranches in Argentina. The meat from Australia and New Zealand is chiefly mutton. In order to keep the mutton fresh during the long voyage it is kept in very cold rooms, in which it would remain quite sweet and good for a far longer time than is needed for the voyage to Britain.

Butter, cheese, and eggs are the most important of the other foodstuffs. Danish butter has already been mentioned. More than two thousand millions of eggs are brought into this country every year. Let us try to realise this enormous number a little better by saying that since the beginning of the Christian era three thousand persons might have had an egg for breakfast every day till the present time, out of one year's supply. Most of the eggs come from France and Russia. Although several famous kinds of cheese are made in Britain the home supply does not nearly meet the demand. We must therefore import large quantities, most of which comes from Canada.

Of all the single industries of this country cotton manufacturing is the most important, because of the number of workers employed and of its valuable products. Britain is much too cold to grow the cotton plant so that we must bring the raw cotton from foreign countries. Most of it comes from the south of the United States, where in the old days the plantations used to be cultivated by negro slaves. Most of the work in the cotton fields is still done by negroes. Egypt and India also send us large supplies of raw cotton. Wool ranks next to cotton among our imports. Most of it comes from Australia and New Zealand. Enormous herds of sheep are pastured on the great plains of these countries where sheep-rearing is the chief occupation of the people.

Another valuable product which is brought to Britain in large quantities is timber. So many things are made of wood that it would be very inconvenient if we could not get plentiful and cheap supplies of timber. Most of the wood used in trade and manufactures is obtained from fir and pine trees. Millions of pounds are spent every year in this country simply in buying wood for pit-props. Most of it comes from Norway and Sweden, while Canada also sends us large supplies chiefly of planks and sawn wood. There is a substance made from wood which has become of very great importance in recent years. This is wood-pulp, which is used in the making of cheap paper. All our newspapers are made from wood-pulp. It seems strange to think that the newspapers we read once formed part of a tall pine tree growing in Sweden or Canada. The wood may be mixed with water and torn and beaten into a pulp by machinery, or certain chemicals may be put in the water that soften the wood into pulp.

As you would expect, the things we export or send away to other countries are quite different from the materials we import. Our exports are nearly all manufactured articles. The raw cotton is spun and woven into cloth, and may be sent back to the very place where the cotton was grown. The same thing happens to the raw wool. We sell to other countries very large quantities of iron and steel goods and machinery. For example, if a railway were being built in South America

Hauling logs in a Canadian timber forest the railway directors might buy their rails in this country, then they might buy from us the locomotives to run on the railway, and if they wanted ships to sail in connection with their railway they would almost certainly come to this country for them, for Britain actually builds more ships than all the other countries of the world put together.

We export large quantities of one substance that is not manufactured, namely, coal. Our mines produce so much that our coal owners sell to almost every country in the world except the United States, where the production is even greater than in Britain.

ENGLAND AND WALES

5. SURFACE AND SCENERY OF ENGLAND

In England we do not find such sharply marked physical divisions as we do in Scotland. If you look at a physical map, however, you will see that, roughly speaking, the highlands of England are found in the north and the west, while the south and east are low and flat. The reason for this is that the rocks of the north and the west are very hard and durable, and are not easily worn down into a plain by the frost and the rain and the rivers.

From the Scottish border, as far south as the valley of the Trent, there stretches a broad band of high ground called the Pennine Uplands. This hilly area is not a line of sharp mountain peaks, but a long tableland. The edges are quite steep, but if you climb to the top you can walk for miles over rough moorland which does not vary very much in height. In one or two places distinct hills are seen, but even these hills are flat-topped. The highest is Cross Fell which is nearly 3000 feet, while Ingleborough, Penyghent, and Whernside are all over 2000 feet. It is not necessary to remember all these names, but you should find them on the map.

The southern part of the Pennine Uplands is calle the Peak District, where the river valleys are exceedingl beautiful. The rivers have a strange habit in places o rushing into great holes and then flowing undergroun for miles. They do this when the rocks over whic they flow are composed of limestone which is easil dissolved. This is the explanation, also, of the wonderfu caverns of the Peak District from which many beautifu minerals are obtained.

Entrance to Peak Cavern, Castleton

If you look at a map you will see that both east an west of the Pennine Uplands there are very many larg towns where a great deal of business is carried on A large amount of traffic has to take place between th eastern towns and the western towns, but unfortunatel the Pennine Uplands form a barrier between them whic is not easy to cross. Luckily, however, the tableland i cut right through in two places by valleys that form gaps in the hills through which traffic can pass. These gaps are of great importance. From the names of the rivers that have caused them, they are called the Tyne Gap and the Aire Gap. Roads, railways, and canals make use of these gaps in order to get from one side of the Pennines to the other.

To the west of the Pennine Uplands there is a mountainous area roughly circular in shape, which is called the Cumbrian mountains, or more commonly the Lake District mountains. Most of the valleys radiate out from the centre of the area like the spokes of a wheel. The highest peaks in the Lake District are Scafell, Helvellyn, and Skiddaw, all of which are over 3000 feet in height. The Cumbrian mountains are joined to the Pennine Uplands by a narrow neck that is not so high as the area to the east or to the west. This part, too, is cut into by a tributary of the Eden, and so forms a fairly easy route for one of the main railway lines between Carlisle and the south.

The Welsh Highlands form a roughly oblong mountainous area. Many ages ago the district was a fairly level tableland, but the frost, the rain, and the rivers have been at work upon it for many thousands of years, and have carved deep valleys out of the block of high ground. The Welsh Highlands are now a rugged area of mountain peaks and deep valleys. The highest mountain in Wales is Snowdon, which is the highest peak in Britain outside Scotland. It is nearly 3600 feet high. Farther south is the fine mountain Cader Idris, 3000 feet above the sea. Between the Welsh mountains and the south end of the Pennine Uplands there is a broad tract of low ground known as the Midland Gate. This affords a wide and easy passage from the south-east to the north-west of England, and thence to Ireland. From the earliest times this low passage has been one of the most important routes in Britain.

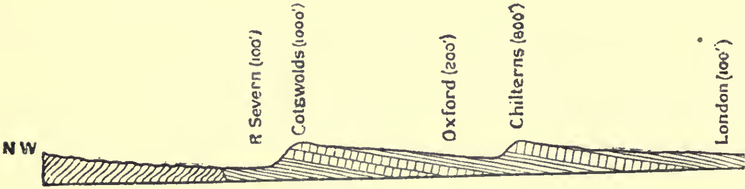
In the south-west of England there are several large areas of high ground. Most of these districts are composed of granite and hard sandstone, that are not worn away so fast as the surrounding rocks. The chief of these highland masses are Dartmoor and Exmoor. They are wide, solitary, trackless moors. The hill summits are called tors, and are covered by enormous granite blocks piled into strange shapes. The scenery is very wild and rugged. These granite areas are very rich in minerals, and tin has been mined for two thousand years.

All the mountainous areas that we have described so far are broad irregular masses of high ground. There are in other parts of England long and narrow ridges that run for many miles in one direction. As you have read on page 44, most of these ridges have a very steep slope on one side and a very gentle slope on the other. The Cotswold Hills are caused by a band of hard limestone occurring among softer rocks. The ridge runs with hardly a break from near the Bristol Channel to the Humber. North of the Humber it can still be traced until it curves out to sea just south of the Tees. It is only the extreme south-west part of this ridge that is known as the Cotswold Hills. The northern end of the ridge is in Yorkshire, where it is called the Cleveland Hills.

A second long ridge runs roughly parallel to the one described. It is formed by a band of hard, white chalk, and can be traced from the Thames above Reading, through Suffolk and Norfolk to the Wash. The southern part of the ridge is highest, and is called the Chiltern Hills. North of the Wash the ridge can be followed again to the Humber. This part is called the Lincoln Wolds. The hills reappear again north of the Humber, where they are known as the Yorkshire Wolds. The chalk band then turns east and runs out to sea just as the limestone band did. You will see from the map how Flamborough Head juts out into the North Sea. The hard, white, chalk cliffs of this cape mark where the line of hills reaches the sea.

If you were to go due south from London you would find the ground gradually rising for about fifteen miles, and then you would be on the summit of a ridge, the southern slope of which falls very steeply away from your feet. From this point a splendid view can be obtained on a clear day. Many miles away to the south you would see the steep edge of another ridge, the steep side in this case facing north. The ridge on which you stand is the North Downs, the hills in the distance are the South Downs, and the country between is called the Weald.

The origin of the Downs is very similar to that of the Chilterns. A bed of hard chalk has been bent into an arch, the axis of which runs east and west. All along the crest of the arch has been worn away and the rocks below the chalk now form the Weald. The two broken edges of the arch, however, stand up boldly as ridges, and these form the North Downs and the South Downs. The chalk rests on clay which does not allow water to pass through it, and so along the steep slope of



Section from Wales to London illustrating the formation of escarpm
and dip-slopes by bands of hard rocks

The Weald, from the Devil's Dyke, Sussex

the Downs a number of springs gush out at the foot of the hills where the chalk rests on the clay. This explains why so many villages are found along this line.

The word *Weald* means the same as the word *Wold* and the German word *Wald*, that is, a forest. Not many centuries ago most of the Weald was covered by dense forests, most of which have been cut down. The very names of many of the villages confirm this fact. If you look at a fairly large scale map of the district, you will find a great many of the village names end in *hurst* or *den*. *Hurst* means a wooded hill, and *den* means a forest.

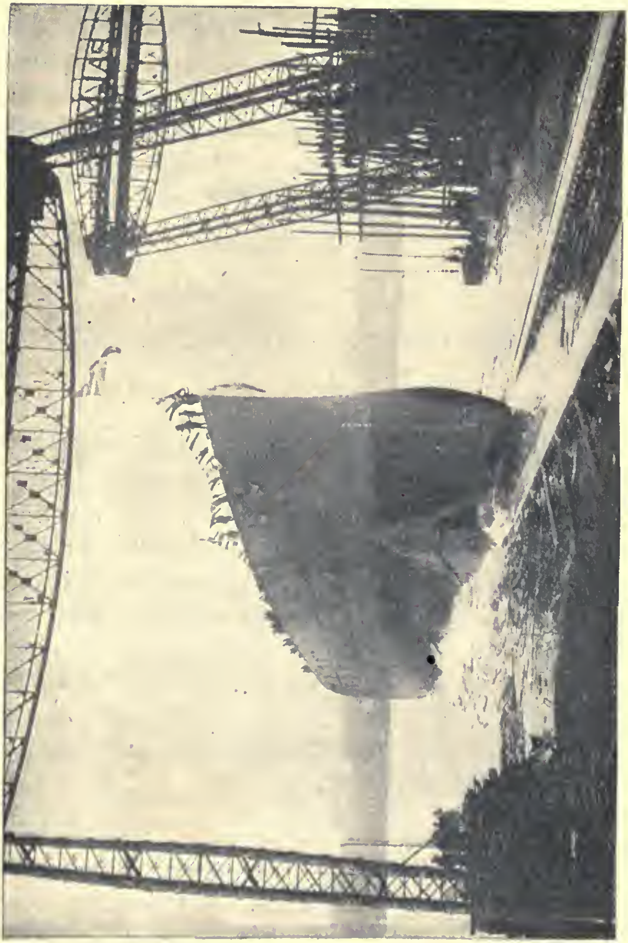
6. MANUFACTURES AND GREAT TOWNS

Part I

A greater proportion of the people of this country is engaged in manufactures of various kinds than in any other country in the world. In order to drive their machinery all the factories must have abundant supplies of coal. We find, therefore, that all the busiest manufacturing districts and all the great cities (with the exception of London) are on or near rich coalfields.

In the north-east of England is found one of the greatest coalfields of this country. This is the Northumberland and Durham coalfield, the output of which is surpassed only by that of the Yorkshire field. Great quantities of coal are exported to foreign countries, and there is also a big, coastwise trade, that is, large supplies are sent by boat to other parts of Britain.

In all the large coalfields of Britain, as well as the trade in coal, there is a big engineering industry. In



Launch of H.M.S. *Queen Mary* at Jarrow

addition there is generally some other industry associated with each field, for example, metal-smelting in south Wales, pottery-making in north Staffordshire, the woollen trade in Yorkshire, the cotton trade in Lancashire, the iron industry in south Staffordshire. In Northumberland and Durham, in addition to coal-mining and engineering, we find a great shipbuilding industry. The banks of the Tyne, the Wear, and the Tees are lined with great shipbuilding yards. This is the most important shipbuilding district in England, and is only surpassed anywhere by the Clyde.

The chief town of the coalfield is Newcastle on the river Tyne. As everyone has heard, its coal trade is famous. There are large engineering works where big guns, locomotives, engines for ships, and many other kinds of machinery are made. There are chemical works which have flourished because both coal and salt are found abundantly in the neighbourhood, for many chemicals are made from salt, and coal of course is needed in all factories. The other towns on the Tyne have a similar trade but on a smaller scale. Sunderland, at the mouth of the Wear, is a great shipbuilding centre. Darlington and Stockton are the principal towns on the Tees.

The Yorkshire coalfield is the largest in the British Isles, and produces most coal. It stretches over the borders of Yorkshire into the adjoining counties. The towns of this coalfield have become the chief centres of the British woollen industry. The industry began by men weaving the wool of the sheep pastured on the neighbouring hills. The streams rushing down the

Pennines were used to drive the mills. When steam-engines came into use, plainly the Yorkshire towns were still well situated for making woollen goods, because of their abundant supplies of coal, and so the industry flourished wonderfully.

Most of the wool-working towns are situated in the valley of the river Aire. Leeds and Bradford are the largest; indeed, the former town is the sixth largest in England. Leeds has an enormous trade in ready-made clothing. In recent years the iron and steel works of this town have become as important as the woollen mills. In addition to its trade in woollen goods Bradford has also large mills for making velvet and plush goods.

It is many a year since the Yorkshire towns found that they could not obtain nearly enough raw wool in this country for their needs. The wool has to be brought from abroad, and our supplies come chiefly from our own possessions. Australia, New Zealand, and South Africa are the countries that export most wool to Britain.

In the south of Yorkshire, but still on the coalfield, is the great steel town of Sheffield. For many centuries Sheffield has been noted for its cutlery. It is said that the cutlery trade began in Sheffield because there was in the neighbourhood a supply of stones suitable for grindstones, and also because of the plentiful water-power close at hand. Everything that can be made of steel is manufactured in Sheffield. Armour-plates for battleships, steel rails, locomotives, motor-cars, and machinery of all kinds are made. The main line of the Midland Railway passes through Sheffield and Leeds.

The south of Lancashire is one of the greatest industrial districts in Britain. It is dotted over with scores of manufacturing towns, in fact this district is one of the most densely populated in the world. Only a small proportion of the coal from the rich Lancashire coalfield is exported, for it is nearly all required to supply the factories of the neighbouring towns. Lancashire is the greatest cotton-manufacturing district in the world, and Manchester is the chief centre of the industry. The raw cotton is bought here, the finished goods are sold here, and the town is a convenient centre both for merchants and manufacturers. An immense amount of special machinery is needed for the cotton industry, and most of it is made in Manchester. Since the opening of the Manchester Ship Canal the town has become a great seaport. The tonnage is not so large as in many other ports, but the value of the goods imported and exported is very high. Of the other cotton towns the largest are Bolton, Oldham, Blackburn, and Preston.

Cotton is grown in warm countries, and so all the raw material used in Britain must be brought from abroad. About three-quarters of all the cotton used in this country comes from the United States of America. Egypt and India also send us large supplies of raw cotton. The cotton cloth made in England is sent to India, the warm parts of America, and similar places.

Most of the raw cotton used in Lancashire is brought into Liverpool, the seaport that ranks next to London in importance. Liverpool's trade has always been chiefly with America. In early times it had a trade in negro slaves. But it was the rise of the English cotton trade, and the rapid growth of so many large towns in Lancashire, that made Liverpool surpass all its rivals except London. Moored to its twenty-five miles of quays will be found ships from every corner of the globe. Its chief imports are raw cotton, grain, meat, and rubber. On the opposite bank of the Mersey is Birkenhead with great engineering works and ship-building yards.

7. MANUFACTURES AND GREAT TOWNS

PART II

In the Midlands of England there are two big coalfields and a few small ones, and therefore we shall expect to find a number of large manufacturing towns. In the north of the Midlands is the north Staffordshire coalfield. In this coalfield there are thick beds of clay which can be used for making earthenware, and therefore the towns of this district manufacture enormous quantities of pottery. In fact there is more earthenware made here than in any other area of equal size in the world, and so the whole district is often called the Potteries. While the local clay is used only for coarse ware, the pure white china-clay of Cornwall is used for fine china or porcelain. The chief pottery towns lie very close together, and so, quite recently, they were all united into one town under the name of Stoke-on-Trent.

In the south of Staffordshire there is another coal-field called the south Staffordshire coalfield. Along with the beds of coal there are found large quantities of iron-ore, and therefore this region has become the greatest iron-working district in Britain. It is a densely-populated area containing a few large cities and a great many smaller towns. On all sides can be seen coal-pits, iron-mines, blast-furnaces, forges, and rolling-mills, which pour forth dense volumes of black smoke from innumerable chimneys. The district, therefore, gets the name of the "Black Country," and is famous for metal-working in all its branches. Pig-iron, steel, nails and chains, screws, guns, pins and needles, motor-cars, tools—these are but a few of the many things made in this district. Wolverhampton, Walsall, and Dudley are the names of three of the many large towns engaged in iron working. In addition there are large numbers of small villages all engaged either in coal-mining or in some branch of the hardware industry.

Birmingham, the capital of the Midlands, is the third largest city in Britain, and requires special mention. It lies a little way to the east of the south Stafford coalfield, for it grew up when wood fuel was used for smelting iron. In addition, it is a long way from any important seaport. These two circumstances make Birmingham unable to compete with other towns in processes such as iron-smelting, where large quantities must be handled at a small cost. All kinds of metal goods, from a screw-nail to a locomotive, are made in Birmingham, and it specialises particularly in small fancy-goods made of metal. Some distance south-east of Birmingham is Coventry, which is the greatest centre in this country for the making of cycles and motor-cars.

In the parts of the Midlands where coal is not found, the flat plains are very suitable for rearing cattle, and this has had an effect on the manufactures of several Midland towns. The counties of Northampton, Leicester, and Stafford all possess large numbers of cattle, and as a result of this we find that the towns of Northampton, Leicester, and Stafford are all important boot-making centres. On the low hills east of the Midlands sheep are reared, and therefore Leicester and Nottingham manufacture hosiery. The latter town is also an important lace-making town. Burton-on-Trent is one of the greatest brewing towns in the world. In order to make good beer the water must contain certain things dissolved in it, and the water in the neighbourhood of Burton-on-Trent contains the proper substances in solution.

The south of Wales is quite different from any other part of that country, for there is a rich coalfield there which makes the district a busy, manufacturing one, with many crowded towns. Much of the Welsh coal is of a special kind, and as it gives out very little smoke when burning it is called "smokeless coal" or "steam coal," and is much used by men-of-war ships. Large quantities of coal are sent from south Wales to all parts of the world; in fact, this field exports more coal than any other in Britain. Cardiff is the great coal-exporting centre and sends abroad more coal than any other town in the world.

South Wales is also noted for the smelting of metals, and Swansea is the chief town engaged in this business. Large quantities of copper are refined in Swansea, and it is the most important centre in the world of the "tin plate" industry. Kitchen utensils, cans, and tins of all kinds are made from tin-plate, that is, thin sheets of iron that have been dipped in melted tin. Is there any reason why tin and copper smelting should be so important in Swansea? The south Wales coalfield is the nearest large coalfield to Cornwall and Devon, where in former times all our copper and tin were obtained. These ores were therefore carried across the Bristol Channel to Swansea and smelted there. In time the copper and tin mines of Cornwall began to be exhausted, and now we obtain most of our tin from the East Indies, and most of our copper from Spain. It is certainly a disadvantage to have to bring the ores so far, but Swansea has obtained such a lead in this industry that no other town has yet been able to rival it.

Senghenydd colliery, South Wales

There are a few large towns which are not situated on coalfields. Barrow-in-Furness and Middlesbrough-on-Tees are similar in many ways, for they have both sprung up entirely in the last hundred years, and both owe their importance to being near valuable deposits of iron-ore. Middlesbrough is the most important iron town in Britain, and Barrow has blast-furnaces, steel-works, and famous ship-building yards. As a rule we do not find large towns in farming districts, but sometimes in such districts a town becomes important and populous because it is a very convenient centre for the agricultural district surrounding it. Ipswich and Lincoln are good examples of such towns, as they contain large factories which manufacture things needed for farming, such as agricultural tools and artificial manures.

Other towns have grown to importance in modern times because of their situation on railways. Half-a-dozen main lines and several smaller lines meet at Carlisle, which is therefore one of the busiest railway junctions in England. Swindon, Crewe, Doncaster, and Derby contain the locomotive works of the respective companies whose lines pass through these towns.

8. LONDON

In many ways London is the most wonderful city in the world. It is by far the largest and has the greatest trade, its history is most interesting, it has many beautiful buildings, and nearly all the famous men of Britain have passed part of their lives in London. From east to west or from north to south one can travel for over fifteen miles and never leave the crowded streets of this huge city. There are more people in this one city than in the whole country of Scotland.

London has been an important town since the Roman invasion of Britain. On the slopes of a little hill near London Bridge the great city grew up. If you are going to London Bridge from the west, you notice the slope quite distinctly when you come to Ludgate Hill. From the earliest times the part of London near the bridge has been the trading centre, and to this day it is called simply the City, where the important banks and the great offices are to be found. Now London soon became so large and important that a royal palace was built near it. A site was chosen about two miles up the river from London Bridge, where there was a little island among the marshes. A great church was built near the palace, and it was called the West Minster, because it was the minster west of the abbey of St Mary or East Minster, in the City of London. To this day the district is called Westminster, and the church is Westminster abbey. Naturally the houses of the noblemen, the Law Courts, and the Houses of Parliament were all built near the palace of the king.

In time a new home had to be built for the king, who now lives in Buckingham palace, and the Law Courts were removed to the Strand. But the Houses of Parliament and all the chief government offices are still in Westminster. Westminster abbey was founded in the 8th century, but was destroyed by the Danes, and then more than once rebuilt. In the beginning of 1066 Harold was crowned king in it, and William the

Conqueror before the end of the year. Since that time all our sovereigns have been crowned in the abbey.

One of the most interesting parts of London is Fleet street, the home of journalists. Every important newspaper in the kingdom has offices in this street. From every corner of the globe telegraph wires are bearing messages to Fleet street, whence they will be flashed to all the large towns, for printing in the local newspapers. Next let us go up Ludgate Hill, and now we see St Paul's cathedral in front of us. We have indeed had glimpses of it before this, for the great dome of St Paul's is the most conspicuous landmark in all London. On this spot there has been a church since the beginning of British history. Before there was a Christian church,

Fleet Street, looking east

the Romans had a temple to Diana here, and the English one to Woden. The present building replaced the cathedral that was burnt to ashes in the Great Fire.

We are now in the heart of old London. The names of some of the streets such as Newgate, Ludgate, Bishopsgate, remind us that London was once a walled town with gates. Going east we are soon at London Bridge, first built by the Romans, and last rebuilt in 1831. At all times of the day London Bridge is thronged with hurrying crowds of people. Let us stand at the parapet and look down the Thames. On our left we see the famous Tower of London. No other building in Britain could tell so many terrible secrets as this grim fortress, which was built by the Normans on the ruins of a Roman fort. Here the two little Princes were murdered by the cruel servants of Richard of Gloucester, and here Lady Jane Grey, Anne Boleyn, Thomas Cromwell, and others of hardly less note were beheaded.

Shipping can come up the Thames as far as London Bridge. There is one bridge, a little below this point, called the Tower Bridge. When a big ship comes up the river, the main bridge is lifted to allow it to pass, and all wheeled traffic is stopped, but foot passengers can ascend a tower and cross by an upper bridge. Below the Tower Bridge is the Pool, a part of the Thames where at all times great steamships, sailing ships, and barges are seen crowded together; and on both sides of the river are large docks.

Owing to the great number of large factories in the east end, London is the greatest manufacturing city in the world. No one particular industry can be singled

The Tower of London

out as specially important, but everything is made that serves the needs or the luxuries of a great and wealthy city. London is at a disadvantage in being so far away from the coalfields, and therefore certain industries are leaving it. Shipbuilding is a very noticeable example. Certain articles, although in common use throughout the country, are imported almost exclusively into London. Thus practically all the tea, more than three-quarters of the rubber, and three-quarters of the coffee used in Britain come into the London docks. Although wool is not manufactured to any great extent round London, more than half the wool imported into Britain comes into this port.

9. THE CHIEF SEAPORTS OF ENGLAND

The two greatest seaports in England—London and Liverpool—have already been described. The port of Hull on the Humber ranks next to Liverpool in importance. Hull has a large trade with all the countries of western Europe, to which it exports the woollen goods of Yorkshire and the cotton goods of Lancashire. It is a convenient port for the North Sea fishing-banks, and so it ranks second only to Grimsby in the fish trade. It imports large quantities of oil-seeds, and is the chief centre in Britain for crushing the seeds in order to procure the oil.

Southampton, the chief seaport on the south coast of England, is a town that is growing very rapidly, for it has many advantages for trade. The busiest commercial sea-route in the world is that between the English Channel and New York; and plainly Southampton is very favourably situated for taking part in this trade. For traffic between London and America it is a more convenient port than its great rival Liverpool. Its nearness to the Continent, too, gives it an advantage over all the other large seaports of Britain. It has the largest share of the trade with South Africa and South America. Southampton is very fortunate in another way, for it has four tides a day instead of two, and so the docks can be reached at any time. High tide comes up the Solent first, and then later up Spithead. With all these advantages Southampton may in time be as great a seaport even as Liverpool.

Avonmouth Docks

Bristol is one of the oldest seaports in this country. In early times it was engaged in the slave trade. The famous sailor, John Cabot, sailed from Bristol in command of the expedition that first discovered the *mainland* of North America. The town is situated on the river Avon, the valley of which forms an easy route between the south-east of England and the Irish Sea, and this circumstance has favoured the growth of Bristol. This seaport was the first to secure a large share of the American trade, and for many years it was the biggest port in Britain except London. The trade of Bristol is still carried on chiefly with America and the West Indies. Tobacco and raw cocoa are imported, and there are large factories for manufacturing these articles. From the West Indies come sugar, bananas, and pineapples.

Fish-pontoon, Grimsby

Many of the seaports of eastern England are engaged almost entirely in the fishing trade. Fish like the sole and the plaice live near the bottom of the sea, and are aught by trawlers, which drag their nets along the bottom; while the herring and the mackerel swim about in shoals near the surface, and are therefore taken by drifters, which spread their nets just below the surface of the sea. Grimsby, on the Lincoln coast, is the most important fishing town in Britain, and the reason for this is not hard to find, if you look at its position with respect to the fishing-banks of the North Sea. Every day train loads of fish are sent from Grimsby to London and the great towns of Yorkshire and Lancashire. Yarmouth and Lowestoft are other busy centres of the fishing trade; but their fleets consist mainly of drifters, which fish chiefly for herrings.

Some of the ports of England are notable because they are naval stations. Portsmouth is the most important naval station in Britain, and the whole life of the town revolves about the dockyards. There are huge storehouses, large dry-docks, and several shipbuilding slips, all for the use of the navy. It was off Portsmouth that in 1782 the *Royal George* went down with nearly a thousand men. The chalk ridge that runs behind the town is very strongly fortified. Plymouth, on the splendid harbour of Plymouth Sound, is another naval station. It was on Plymouth Hoe that Drake and his captains were playing bowls when news came of the approach of the Invincible Armada.

Packet-stations are seaports which are engaged chiefly in passenger and mail traffic. The packet-stations of south-east England have daily sailings to Continental ports. Fast steamers connect Dover with Calais, Folkestone with Boulogne, and Newhaven with Dieppe. You should measure the distances between these ports, and find out roughly the time taken to cross. Harwich is the most important packet-station on the east coast, and can be reached in an hour and a half from London. Passengers then go on fast steamers which cross to the Hook of Holland. From there express trains run to Berlin, and right on to Moscow and Petrograd. Harwich has a large import trade, chiefly of perishable articles (such as butter, eggs, meat, and poultry) and high-grade fancy-goods from the Continent.

In the extreme south-west of Wales the packet-station of Fishguard has become important in recent years. It is situated where the Irish sea narrows until only sixty miles separates Wales from Ireland. Some of the American mail-steamers land their letters at Fishguard, where they are put into express trains and carried to London. Heysham on the Lancashire coast is a packet-station which has frequent fast sailings to different parts of Ireland and to the Isle of Man.

SCOTLAND

10. THE BUILD OF SCOTLAND

First of all let us find out from the map some facts about the size of Scotland. With a ruler measure the distance from Duncansby Head to the Mull of Galloway, and find how many miles this distance represents by using the scale of miles on the map. Next find the width of Scotland at its widest part, and at its narrowest part between the Firth of Forth and the Firth of Clyde. Measure also the shortest distance between Scotland and Ireland. Now if you remember that a fast boat sails at about twenty miles an hour and a train runs at about twice that speed, and if you will find how long it takes to go by boat and train between various places on the map you will begin to have some correct idea about the size of Scotland.

You know that our country is divided into a great many counties. The boundaries of these counties are very irregular, and, in addition, there often seems no real reason why any division should be made. The land on both sides of a county-boundary often seems quite the same, and one would never think, if not told, that one was passing from one county to another. Boundaries such as these are not natural but historical. Nearly every country, however, can be sub-divided into parts that really show marked differences from one another, and are separated by natural boundaries. Scotland is a good example of this fact.

There are three well-marked natural divisions of Scotland, and each division is quite different in many respects from the others. On your map find Stonehaven and Dunbar on the east coast, and Helensburgh and Girvan on the west coast. Now imagine a line drawn between Stonehaven and Helensburgh, and another line between Dunbar and Girvan. These two lines divide Scotland into three parts, and these are the three natural divisions of Scotland. Look at the part north-west of the Stonehaven-Helensburgh line. The map shows that it is very mountainous, and therefore this part is known as the Highlands of Scotland. Now ook at the part between the two lines. Most of the ow ground of Scotland is contained between these lines, and so we call this part the Central Lowlands. Next ook at the third division which includes the southern part of Scotland. The map shows that it is more hilly han the Central Lowlands, but not so mountainous as he Highlands. This division of Scotland is called the Southern Uplands.

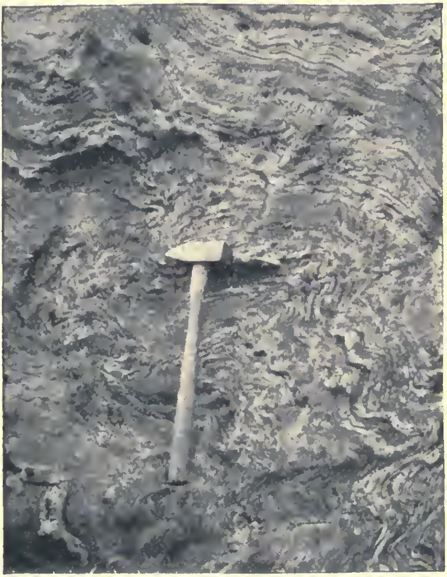
If you look again at the Highlands you will see that hey are cut in two by a long, straight, and deep valley, hat runs between Loch Linnhe and the Moray Firth. here are three lakes in this valley, and they are joined y the Caledonian Canal which thus cuts right across

Scotland. The valley is called Glen More, which means the Great Glen. The Highlands, therefore, may themselves be divided into two parts. The part to the south-east of Glen More is known as the Grampian Highlands, while the other part is called the North-West Highlands.

The dividing lines between the different parts of Scotland are very sharp and clear. By walking a few yards you may cross from the Lowlands to the Highlands. The explanation of this is very simple. Between Stonehaven and Helensburgh and between Dunbar and Girvan there run two great cracks (generally called " faults ") between which the whole of Central Scotland has gradually sunk. The rocks of which the Central Lowlands are composed are more easily worn away by the weather than the rocks of the Highlands or the Southern Uplands, and so the Central Lowlands on the whole are flat, while the other parts of Scotland are mountainous.

If you were to stand on the top of a Highland peak you would see no regular ranges or lines of hills. On all sides would be seen a confused sea of mountains with no regular order or arrangement. The photograph on p. 43 gives you a good idea of this. The Highlands consisted originally of a fairly level tableland. Think of a great slab of hard rock about two hundred miles long, about two hundred miles wide, and nearly a mile high. Rain, rivers, frost, and ice have been at work on this slab for ages, carving out the softer parts into valleys and leaving the harder parts as mountains. All the mountains in the British Isles have been formed in this way. They are simply the harder parts of the country and so take longer to wear away.

It is generally easy to recognise the rocks of the Highlands even if you only see a small piece. They have usually been bent and twisted in the most wonderful way. Look at this photograph of a piece of rock from the Highlands. Most of the light-coloured bands are composed of quartz, a mineral so hard that you cannot scratch it with a knife. Yet you see that these hard bands are bent and twisted as if they had merely been ribbons. The pressure that squeezed these rocks into their present condition must have been enormous.



Piece of rock from the Highlands

In fact it has lately been discovered that so great were the forces at work that huge slabs of solid rock many square miles in extent have been torn away from their proper position and pushed for considerable distances over the other rocks.

The scenery of most parts of the Highlands is very wild and rugged. The mountains are higher than those of any other part of Britain. The outlines of the mountains, too, are usually rough and broken, the ridges are sharp, and there are often great precipices on the sides. Ben Nevis is the highest mountain in the British Isles. It is over 4000 feet above the sea. Only half a dozen other mountains in this country reach that height, and all of them are in the Grampian Highlands. The district at the meeting place of the counties of Aberdeen, Inverness, and Banff forms the largest area in Britain more than 4000 feet above the sea. In this district there are four mountains over 4000 feet high, the largest being Ben Macdhui (beinn muic duibhe) which means "mountain of the black sow." One other mountain may be named not because of its height, for there are many higher peaks in Scotland, but because it is well known. This is Ben Lomond which overlooks the beautiful Loch Lomond, one of the loveliest lakes in Scotland.

The hills of the Southern Uplands are neither so high nor so rugged as those of the Highlands. The highest is Merrick in Kirkcudbright (pronounced Kirkóobri), which is less than 3000 feet high. The ridges are usually smooth and there are few great precipices such as are found in the Highlands. The upper photograph

Types of hills: southern upland type

Types of hills: lowland type

on p. 87 shows a typical scene in the Southern Uplands. Many parts, however, are wilder and grander than the district shown in the picture. The north-western edge of the Southern Uplands sometimes gets the names Moorfoot Hills and Lammermuir Hills, but these are really just the edge of the Uplands where they overlook the central plain.

The central part of Scotland is called the Lowlands, and has been referred to as a plain, but you must not think there are no hills in this district. In many parts the land is 2000 feet above the sea. The Lowland hills, however, differ in appearance from those of the Highlands and the Southern Uplands. They do not rise into prominent peaks, but are tablelands with fairly flat tops. They are formed of great blocks of hard rock which have resisted the destructive action of the weather better than the rocks of the surrounding low ground. The lower picture on p. 87 shows an example of the hills of the Central Lowlands. There are four separate hill-masses that lie in a straight line from north-east to south-west, parallel to the fault separating the Highlands from the Lowlands. These are the Sidlaw Hills, Ochil Hills, Campsie Fells, and Kilbarchan Hills. The low ground that stretches right across Scotland between these hills and the Highlands is called Strathmore, which means the Great Valley.

Some parts of Scotland are frequently affected by earthquake shocks. Of course, we never experience such dreadful disasters as occur in some countries, where thousands of lives are sometimes lost by earthquake shocks. Yet the earth even in Britain trembles sometimes to an alarming extent. Nearly all the shocks are felt in the vicinity of faults. The solid crust of the earth is cracked right through at these faults, and the earthquake is probably due to a great mass of rock suddenly sinking a little. This sets up a vibration in the whole surrounding district, and the trembling of the rock is known as an earthquake.

11. RIVERS AND LAKES. Part I

If you look at your map you will see that practically all the big rivers of Scotland flow to the east coast. The only important river flowing to the west is the Clyde, and we shall see later that there was a time when it also flowed to the east. First of all we must learn the names of a few of the chief rivers and trace their courses on the map from source to sea. There are four rivers which are far more important than any others. These are the Tay, the Forth, the Tweed, and the Clyde. There are four other large rivers which are worth knowing although not so important as the ones just mentioned. These are the Spey, the Dee (Aberdeen), the Annan, and the Nith (Dumfries).

A long time ago, before any people lived in this country, Scotland extended much farther to the west than it does now. The islands off the west coast then formed part of the mainland. The surface of the land was not cut into by rivers and lochs, but formed a great plateau or tableland which sloped very gently to the south-east. No doubt the tableland had a slope to the west, too, but that part has long ago disappeared beneath the waves of the Atlantic Ocean, and so we know very little about it. Since the tableland sloped to the south-east most of the rivers began to flow in that direction, for the rivers were just beginning to be formed at this time. This explains then why the Nith, the Annan, the Tweed, the Forth, and the Tay all flow in a south-easterly direction. The main difference between the present courses of these old rivers and their courses when they were young is that they formerly rose much farther to the west, perhaps even where the Atlantic Ocean now is.

We have just been talking about young rivers and old rivers, and at first it seems strange to talk about rivers as if they were alive, but yet there is a good deal of truth in the notion. A young river is just like a boy. It comes rushing along at a great pace, and although it is not very big and does not do very much work it makes a lot of noise and fuss. A mature river is like a middle-aged man. It goes along quietly and steadily, and works hard at digging out its valley and carrying a heavy load of mud and stones towards the sea. An old river meanders slowly along, flowing first to one side then to another just like an old man with tottering steps. It lays down the load of mud that it has carried so far, just as an old man gives up work, and finally it is swallowed up by the sea.

Rivers, too, are constantly struggling to become stronger at the expense of their neighbours. They are great thieves. It is not uncommon for a river to steal the tributaries of another stream. If you want to see a regular thief of a river look at the river Clyde. From the map you will see that many of the lochs branching off the Firth of Clyde (Gareloch, Holy Loch, Loch Goil, Loch Striven, etc.) point to the south-east. These lochs occupy the valleys of streams that once flowed right across Scotland into the North Sea. But the Clyde carries off to the Atlantic all the water flowing into these lochs. Of course, these processes take place very, very slowly, but still they are constantly going on.

Falls of Muick, Ballater

The Spey rises in Inverness-shire and enters the sea in Elgin county. Of Scottish rivers only the Tay is bigger and longer, but the Spey is the swiftest river in Scotland. It flows too quickly to be of any use for navigation. It is a fine salmon river, and in the season is visited by many English fishermen. Part of the Spey valley is used by the Highland Railway between Perth and Inverness. The Dee rises in the south-west of Aberdeenshire in the heart of the Cairngorm Mountains. In the upper part of its course the scenery is wild and stern in the extreme. The stream foams along in a narrow defile, while round about it frown the precipices of the Cairngorm Mountains. Farther down the river on the south bank stands the royal castle of Balmoral. Aberdeen is situated at the mouth of the river. The Dee is a good fishing river both for salmon and trout.

12. RIVERS AND LAKES. PART II

The Tay is the longest and in some respects the most interesting river in Scotland. It rises in a little corrie far up the slopes of Ben Lui, a high mountain on the borders of Perthshire and Argyllshire. It is not called the Tay until it leaves Loch Tay, a long narrow lake, dug into deep basins by the glaciers that flowed along the valley in ancient days. On one side towers the huge bulk of Ben Lawers which (if we include the cairn on its summit) is one of the few mountains in this country more than 4000 feet in height. Lower down, the Tay is joined by the Tummel which receives the rushing Garry from the Pass of Killiecrankie. It was here that in 1689 the Highlanders came rushing down like one of their own mountain torrents, and at the first stroke swept away the red-coats, but with the loss of Bonnie Dundee, who fell while waving on his men to victory.

Below Dunkeld the Tay loses all its wildness and sternness, but takes on a character of gentle beauty that makes the stretch between Dunkeld and Perth as charming a river valley as any in the country. It was from a hill near Perth that the Romans are said to have caught their first glimpse of the Tay and shouted in rapture, "Behold the Tiber! Behold the Field of Mars!" But Sir Walter Scott says,

> "'Behold the Tiber!' the vain Roman cried,
> Viewing the ample Tay from Baiglie's side;
> But where's the Scot that would the vaunt repay,
> And hail the puny Tiber for the Tay?"

The head streams of the Forth rise in the slopes of Ben Lomond and other mountains east of Loch Lomond. In its lower course the windings of the river are very remarkable. When a river swings from side to side in this fashion it is said to meander. Meanders are found only in old rivers flowing through land that is nearly flat. The windings of the Forth are known as the Links of Forth, and the ground near the river is so fertile that there is an old rhyme saying,

> "An acre on the Links o' Forth
> Is worth an earldom o' the north."

The Teith, the largest tributary of the Forth, drains a lake district of exceptional beauty. The best known of the lakes is Loch Katrine, by some people considered the most beautiful lake in Scotland. Dorothy Wordsworth described part of it as "the perfection of loveliness and beauty." It is as useful as it is beautiful for it furnishes copious supplies of the purest water to the great city of Glasgow, thirty miles away. Below Loch Katrine is the famous valley known as the Trossachs, one of the finest mountain passes in Scotland. The low ground is richly wooded, while on each side rocky walls rise up steeply to the rugged peaks of Ben A'an and Ben Venue. Sir Walter Scott first made this district famous by his descriptions of it in the *Lady of the Lake.* In this locality, too, the noted Highland bandit Rob Roy performed many of his exploits.

The famous writer George Borrow once said, "Which of the world's streams can Tweed envy, with its beauty and renown?" The scenery is, perhaps, hardly so fine as that of parts of the Tay or the Forth, but certainly the historic memories associated with the river are more interesting than those of any other river in Scotland. The Tweed rises not far from one of the sources of the Clyde, a fact which gives rise to the old rhyme,

"Annan, Tweed, and Clyde
A' rise out o' ae hill side."

We have already pointed out that the hills of the Southern Uplands, among which the Tweed flows, are softer and less rugged than those of the Highlands, and so the scenery is beautiful and pleasing, but not so grand as we find among the northern streams. The river flows past Neidpath Castle, an old, grey, thick-walled ruin made famous by Sir Walter Scott. Abbotsford, Sir Walter's house, is situated near the Tweed, and lower down, the river passes beside the beautiful ruins of Melrose Abbey, the finest in Scotland. Mungo Park, the famous explorer of the Niger, and James Hogg, the Ettrick Shepherd, were natives of tributary valleys of the Tweed. Many of the Border Ballads have their scenes placed somewhere in Tweeddale. There

Melrose Abbey

is fine salmon and trout fishing, in fact the Tweed is quite the most popular fishing stream in Scotland.

All the best known lakes in Scotland occur in the Highlands. There are thousands of them varying from Loch Lomond, over twenty miles long, to the smallest mountain tarn a few yards in width. The large lakes are called lochs, and the small ones lochans. Many of them are exceedingly beautiful and are visited by thousands of tourists every year. In the North-West Highlands we may mention Loch Morar which is not very well known, but is remarkable for its great depth. The bottom of the loch is more than a thousand feet below the level of the sea. There are only two other lakes in the whole of Europe that sink so far below the sea-level.

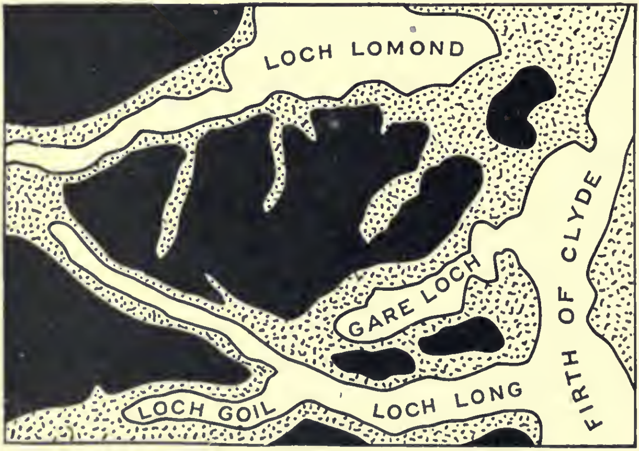
In the Grampian Highlands there are so many beautiful lakes that it is difficult to select one or two for special mention. Most people think that Loch Lomond and Loch Katrine are the two loveliest lakes in Scotland. Certainly they are the most visited by tourists. Most of the Highland lakes show very plainly the marks of glaciers that formerly moved slowly down the valleys in which the lakes are found. It seems likely that the lake basins were scooped out by the ice. In some cases the lakes have been formed by the material left by glaciers, acting as a natural dam just as a miller dams back a stream to form a mill-pond.

13. ISLANDS AND LOCHS. PART I

If you look at a map of Scotland you will notice what a number of islands there are off the west coast. People live on all the larger ones, but many of the smaller ones are quite uninhabited. The west coast islands may be divided into two main groups. The Outer Hebrides lie farthest west, about thirty to fifty miles away from the mainland. Closer in shore are the Inner Hebrides, many of which are separated from the mainland only by very narrow channels. To the north of Scotland, across the stormy waters of the Pentland Firth, are the Orkney Islands, and still farther off are the Shetland Islands.

In addition to these main groups there are hundreds of rocky islets, many of which are dangerous to sailors, and so lighthouses have been built on a number of them. The Bell Rock off the Firth of Tay is a good example of such islets. Before the lighthouse was built, it was thought to be the most dangerous spot on the east of Scotland. The name refers to an old story, that the good Abbot of Aberbrothock fixed a bell to the rock which was continually rung by the waves and so warned sailors of their danger. Ralph the Rover out of sheer wickedness cut away the bell, but the following year the cruel pirate was justly punished by being wrecked on the very rock from which he had cut away the warning signal.

Let us see if we can find out how the islands off the west coast of Scotland have been formed. It will help us if we first of all consider the sketch on p. 98, which represents part of the mainland of Scotland between Loch Lomond and Loch Long. All the land that is more than 500 feet above sea-level is shown in black. Now let us suppose that the sea gradually rises for 500 feet and covers all the land that was formerly less than that height above the sea. It is plain now that the appearance of the area is as seen in the sketch. The land that formerly was a part of the mainland is now converted into six islands just like the islands off the west of Scotland. It seems very likely then that something of this kind has actually taken place many ages ago. The mainland stretched much farther west then than it does now. But the sea gradually rose or the land sank until the valleys were filled with water and many islands were formed.



Sketch-map of Dumbartonshire Highlands to illustrate formation of islands and sea-lochs

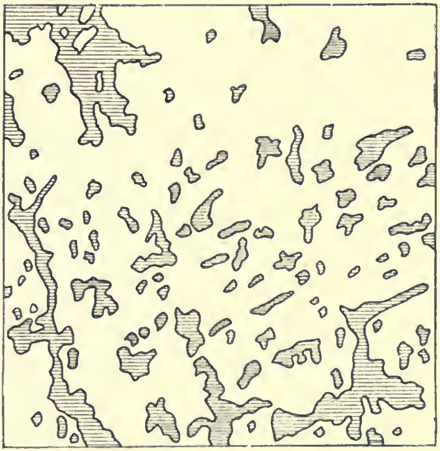
The Shetland Islands are made up of over a hundred separate islands, but only about thirty are inhabited. Most of the islands are very rocky and have bold cliffs facing the sea. The storms are sometimes very violent, and the waves rage round these coasts with a fury that is unknown in any other part of the British Isles. Great blocks of rock many tons in weight are sometimes torn away and dashed about the shore like pebbles. The cliffs have been carved by the sea into strange and rugged forms and are pierced by many long caves. The precipices form the home of great numbers of sea-birds.

The islands are so wind-swept that trees of any size are unknown, and stunted bushes alone resist the fury of the blasts from the ocean. It is difficult for crops to be grown. The fields of oats, barley, and potatoes often blacken and rot before the crop is ripe. Fishing is the chief industry. Most of the men are fishermen in the first place and also farm a small croft. They are very skilful climbers and often make very difficult and dangerous ascents of the crags for sea-birds and their eggs. Nearly all the women knit articles from the fine worsted made from the wool of the native sheep. Shetland shawls are famous. The little Shetland ponies are well known. They are very strong and hardy, and no wonder, for they run in herds over the islands and pick up a living both in winter and in summer as best they may. The only town in Shetland is Lerwick, the chief fishing station.

The Orkney Islands are separated from the mainland by the Pentland Firth. The tide rushes through the stormy firth with such speed that at times even a steamer can make no headway against it. The Orkneys resemble the Shetlands in many ways, especially in the fine cliff scenery, the flat treeless surface of the islands, the fearful storms that rage on the coasts, the numbers of sea-birds, and the occupations of the people. Kirkwall is the only town and carries on most of the trade. It has a very fine old cathedral that was founded in the twelfth century.

Shetland ponies

The Outer Hebrides consist of a long chain of islands extending for over a hundred miles. The most northerly island is by far the largest. The northern part of it is called Lewis and the southern part Harris. In appearance and scenery the Outer Hebrides differ very strongly from the Shetlands and the Orkneys and also from the Inner Hebrides. On the whole the hills are low and rounded and possess little of the grandeur of Highlands. Their smooth domes rise grey and bare with neither trees nor grass to cover them. The cliff scenery, too, is generally tame. One peculiar feature is the immense number of lakes and lochans which are dotted over the surface of the bare rock. The drawing below shows how numerous are these little lakes in certain parts.



Part of the Island of Lewis showing the remarkable number of small lakes

The crofters have hard work to make ends meet. They live in poor stone huts sometimes without windows and chimneys. The smoke from the peat fires finds its way out by the door or through an opening in the thatched roof. The hard life of the people is shown in their grave, unsmiling faces. Too often most of the severe manual labour is done by the women. Yet the people are passionately fond of their homes, and when settled in much more fertile lands pine for their native islands.

> "From the lone sheiling of the misty island,
> Mountains divide us, and the waste of seas,
> Yet still the blood is strong, the heart is Highland,
> And we in dreams behold the Hebrides."

The men are fishers, but let the east coast fishermen carry off all the finest hauls. Some of the people are employed in curing fish, while most of the women weave woollen goods such as blankets. In a few places the famous Harris tweeds are woven by hand. Stornoway in Lewis is the only town. It is the headquarters of the fishing fleets. In the herring season the bay is crowded with fishing boats from every part of Britain.

14. ISLANDS AND LOCHS. PART II

The Inner Hebrides are different in many respects from the outer islands. In some of the islands the scenery is very grand. The black and jagged mountains of Skye are wilder and sterner than any other part of Britain. Sir Archibald Geikie, who has written a well-known book on *The Scenery of Scotland*, thinks that the colouring and the beautiful effects of light and shade are finer in the western isles of Scotland than in any other part of Europe. Another writer, looking from the mainland to the Inner Hebrides, speaks of "the long stretch of Islay and Jura with their purple peaks standing out so sharply against the broad bars of molten gold, and the nearer islets floating in a sea whose hue changed from bright emerald to deepest violet, with countless sparkles at every throb."

Skye is the largest of the Inner Hebrides. Along the north and east coasts the scenery is very fine. In places the cliffs appear like tumbled blocks of giant masonry; again, in columns, pinnacles, and spires like a great cathedral, and coloured in soft shades of red and green and purple. In the south of the island are the Cuchullin (or Coolin) Hills, the highest parts of which are over 3000 feet above the sea. They have been carved out of very dark-coloured rock, their crests are jagged and saw-toothed, and they give an impression of dark, stern, and savage grandeur unequalled in Britain. The Coolins are famous among mountaineers

Cuchullin Hills, Skye

who love to visit them because of the many difficult and dangerous climbs that can be made among them. There is no real town on the island, Portree being but a large village. It is a seaport on the east coast dealing chiefly in fish and sheep and cattle.

The most important of the other islands of the Inner Hebrides are Mull, Jura, and Islay. In many respects they resemble the parts of the Hebrides already described, although Islay is for the most part fairly low-lying. The people have to struggle hard for a living. They live in poor stone huts and are mainly crofters and fishermen. Woollen articles are knitted or woven in most of the islands. In Islay, Skye, and Mull there are distilleries for the making of whisky. Tobermory (the well of Mary), a little town in the north of Mull, is one of the centres of the herring fishing. In Tobermory Bay one of the ships of the Spanish Armada was blown up; and quite recently divers have found and brought to the surface relics of this old ship lost so many years ago.

The most peculiar feature of the western coast of Scotland is the way in which it is cut up by sea-lochs. It is sometimes said that the violent waves of the Atlantic Ocean have been the cause, but this is certainly not the case. Waves take broad bites out of a coast-line, they carve slices off it, they cannot wear out narrow inlets twenty miles long. The sea-lochs of the Scottish Highlands are long and narrow; they do not decrease in breadth as they are traced farther into the land, in fact the lochs are often narrowest at the mouth; the sides are steep and rocky and have waterfalls tumbling down them; and the bottom of the loch is often hollowed out into several deep basins. In all these respects the Highland lochs resemble the fiords of Norway and so they are often called fiords.

We are not quite sure how these fiords have been formed. We mentioned before that the mainland of Scotland formerly stretched farther west. The western part was fractured and broken, and much of it sank below the sea. The newly formed west coast would be much broken by faults, and along these fault-lines it is believed the fiords have been formed. The deep basins have probably been dug out of the rock by glaciers during the Ice Age. Many of the most beautiful of the Scottish sea-lochs are little known for they are in the North-West Highlands, most parts of which are difficult to reach. Certainly the best known of the lochs are those that branch off the Firth of Clyde. Loch Long is a good example of a fiord. Loch Fyne is also a typical sea-loch and is visited by most of the visitors, who spend their holidays on the Firth of Clyde.

15. THE HIGHLANDS. PART I

We saw in a former chapter that the Highlands of Scotland were divided into two parts by the long, straight, and narrow valley of Glen More. A canal called the Caledonian Canal has been made right through this valley, but it is not large enough to take big ships. The Highlands are very beautiful at all seasons of the year. In winter the snow lies deep on the mountain tops, and in late summer the whole countryside is purple with heather. But most of the district is very barren. Where the grass is fairly thick sheep are reared, but in many parts there is not enough pasture even for sheep. These barren mountain slopes are used chiefly for rearing game in order to provide sport for wealthy people who come in the autumn to shoot grouse or deer. The hillsides on which the deer roam are called deer-forests, but the name is misleading. You may walk for hours and never see a tree.

If you look at the map you will see that the west coast differs from the east. There is a broad band of low ground stretching along most of the east coast of the Highlands, but in the west the land fronts the sea in lofty cliffs. Since the wind blows usually from the west this coast is very rainy. Hardly any crops are grown. A patch of oats and some potatoes may adjoin the rude houses of the crofters, but most of the Highlanders of the west coast are fishermen. The east coast is not so hilly and is drier and sunnier and so there are far more people. Good crops can be grown and cattle can be reared, and thus there are prosperous farms. Round the coast fishing is carried on in all the villages. The fishermen are more industrious and enterprising than those on the west coast. Aberdeen is much the largest centre of the east coast fishing trade.

There are no manufactures of any importance in the Highlands. The chief causes of this are the difficulty of access and the absence of coal. In recent years, however, it has been found possible in hilly countries to use the power of water-falls instead of coal. Such falls are called "white-coal" by the French. There are two places in the Scottish Highlands where falls are used to drive machinery, namely Kinlochleven and Foyers. The power of the water-fall drives electrical machinery which is used for smelting metals. This method of driving machinery would probably be much more common if the coal supplies of this country were not so abundant.

The extreme north-east of Scotland is not Highland from any point of view. The land forms a low plateau ending on the coast in steep cliffs. Most of the people are fishermen. The rocks of this district split easily into large thin slabs and so "Caithness flags" are used for paving-stones. The Gaelic language is not spoken here for the people are not of the same race as the Highlanders, but are akin to the inhabitants of Scandinavia. In olden times, in fact, this part of Scotland was under the rule not of the Scottish kings but of the Norse earls of Orkney.

Aberdeen is the largest city in the Highlands and ranks fourth in size among the towns of Scotland. It is a finely built town, and is sometimes called the Granite City, from the material used in many of the buildings. Granite is used because of the fine quarries in the neighbourhood. Large quantities of granite are exported to be used for monuments, bridges, piers, lighthouses, and buildings of all kinds where strength is necessary. The granite of Aberdeen is grey in colour, and on a sunny day not only do the buildings of the city look strong and massive but bright and sparkling also. Aberdeen is the chief centre of the east coast fisheries of

Scotland (see p. 50). A great many of the fishing-boats are built and engined in this town.

Aberdeen has been an important place for many centuries, and if you look at the map you will see the reason. North of Aberdeen the mountains recede from the coast leaving a broad and fertile plain between them and the sea. South of Aberdeen the low ground widens into the rich district of Strathmore. But near Aberdeen the Grampian Highlands come very close to the shore leaving only a narrow passage through which all the traffic must pass. Just where this passage is crossed by the largest river of the district Aberdeen is situated.

16. THE HIGHLANDS. PART II

We have seen that the Highlands are cut completely in two by Glen More, and this valley forms much the easiest route through the Scottish Highlands. In former times, therefore, before the Highlands became a peaceable district, this route would be of extreme importance for military affairs. So it is not surprising to find a flourishing town at each end of this route: on the west Fort William, on the east Inverness. We can conclude at once that of these two places Inverness will be the more important, for the neighbouring district is much more fertile and populous.

Inverness is situated at the crossing place of three routes. It stands at the end of the easy road through Glen More; the traffic along the north-eastern lowland strip must pass through the town; and a route through the heart of the Grampian Highlands emerges on low ground near the town. This makes Inverness a railway centre and a convenient market-town for the surrounding district. In summer Inverness is a very busy tourist centre. A few miles east of the town is the moor where the battle of Culloden was fought in 1746.

Fort William at the east of Glen More is also a very convenient centre for getting to different parts of the Highlands, and so in summer it is full of visitors who have come by water, or by rail, or by road. Fort William is the best centre from which to make the ascent of Ben Nevis. A rough track leads almost to the summit of the mountain, and the ascent of the track though tiresome is not difficult. On the north-east side, however, the mountain drops sheer down in a terrible precipice. From the summit a glorious view may be had over mountain, loch, island, and sea. Ten miles down Loch Linnhe from Fort William is the entrance to Loch Leven. Opening into this loch is lonely Glen Coe, one of the sternest and most desolate glens in Scotland. The wildness of the scene is heightened by the sad memory of the terrible massacre of the Macdonalds in 1692.

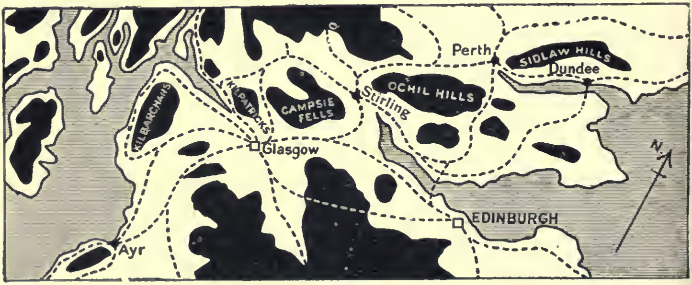
At the entrance to Loch Linnhe is Oban, the chief centre of the steamer traffic of the West Highlands. The bay is spacious and safe, and the situation of the town is one of the finest in Scotland. From the heights behind the town one sees in the foreground the blue waters of the bay with the sun shining white on the sails and sparkling on the brass-work of the yachts.

Oban

Westward are the peaks of Mull and northwards the misty summits of Morven and the dark mountains round Glen Coe, while due east rise the massive granite shoulders of Ben Cruachan. Like the places already mentioned Oban owes its prosperity to the tourist traffic of the West Highlands.

The fair city of Perth is in many ways one of the most interesting in Scotland. The view from a neighbouring hill Sir Walter Scott describes as "one of the most beautiful which Britain or perhaps the world can afford." Perth, too, has more interesting historical memories than any other town in Scotland except Edinburgh. Scone (pronounced Skoon), which was almost on the same site as Perth now is, was the crowning place of Scottish kings from the twelfth century to the fifteenth. On the North Inch the famous fight took place between Clan Chattan and Clan Kay. Perth was the scene of the murder of James I and later of the Gowrie Conspiracy against James VI. At the present time Perth is an important railway junction and has a number of minor industries of which dyeing and French cleaning are the chief.

Is it only by chance that Perth has been an important city for so long, and that so many great historical events have taken place in it or near it? Or is there something in the situation of Perth that explains the history of the city? Look at the map on p. 112. North-east of the Tay are the Sidlaw Hills, south-east are the Ochil Hills. The traffic of the district is forced to the low ground and therefore passes through Perth. Remember that in former times the most important part of Scotland was the lowland strip along the east coast from Berwick to Aberdeen. Perth is situated about the centre of this strip and so was a convenient place for the capital of the country. Again, the easiest way of crossing the Grampian Highlands from the south is by going up the Tay valley, and Perth commands this route.



Sketch-map of Central Lowlands illustrating the control of railway-routes by the relief of the land. The black areas represent land more than 500 feet above sea-level

It will nearly always be found that a town which commands several important routes has had a long history. Very often, too, at the present time such towns will be found to be important railway centres, and the reason for this is quite plain. Think of Chester and Carlisle and you will see that like Perth these towns were once important military places and are now great railway junctions.

17. THE SOUTHERN UPLANDS

In the chapter on the build of Scotland we saw that the Southern Uplands formed a broad band of high ground stretching right across the south of the country from north-east to south-west. If you look at a physical map you will see that the edge of the hilly ground runs in a fairly straight line from Dunbar to Girvan. This high ground was originally a flat tableland, but it is now trenched into countless hills and dales by the valleys that run in all directions through the Uplands. A person looking south from the Central Lowlands is apt to mistake the edge of the Southern Uplands for a long narrow range of hills. In fact the names Lammermuir Hills and Moorfoot Hills have been given to what is just the north-western edge of the Southern Upland plateau.

The hilly belt stretches right over the border into England where it is continuous with the Pennine Uplands. The part of the Southern Uplands on the borders of England and Scotland is known as the Cheviot Hills. The highest single mountain in the Southern Uplands is Merrick which is not far short of 3000 feet high. The scenery of many parts of the Southern Uplands is very fine although not so rugged and grand as the scenery of the Highlands. The hills are smooth in outline and there are few of the jagged ridges and great cliffs that make the Highlands so impressive.

The chief rivers in the Southern Uplands are the Annan, the Nith, and the Tweed and its tributaries.

Notice the peculiar course of the Nith. It first of all takes a north-west direction as if it were going to flow to the Firth of Clyde. Then after having left the hills it swings right round and flows through the heart of the Southern Uplands to the Solway Firth. The Scottish Borders and the valleys of the Southern Uplands are all rich in historic memories. Most of the ballads of Scotland deal with events that took place in this district. The Borders, too, were the scenes of most prolonged and bitter strife between England and Scotland.

Many of the most famous Scotsmen have been born in the Southern Uplands. Bruce was probably born at Lochmaben in Dumfriesshire. The same county produced Thomas Carlyle, and the great African explorer Joseph Thomson. Scott and Hogg, the Ettrick Shepherd, lived in Tweeddale and wrote of its beauties, while Telford, the engineer, and Mungo Park, the explorer of the Niger, are two other famous sons of the Southern Uplands.

Except for some unimportant seams in the valley of the Nith there is no coal in the Southern Uplands. We do not find, therefore, any great manufacturing town such as the Lowlands can boast of. A few of the chief industries, however, are worth mentioning. The slopes of the hills are generally covered with grass and so form good pastures for sheep. All over the Southern Uplands, therefore, sheep-rearing is a typical occupation. In fact Roxburgh has more sheep in proportion to its size than any other county in Britain.

Before a manufacture can grow up there must be two things, good supplies of raw material, and power to drive the machinery of the factory. In the Southern Uplands wool was easily obtained, and the streams of the district could be used to drive machinery and so a brisk woollen industry grew up in the south of Scotland, particularly in the Tweed valley. When coal displaced water power for driving machinery the towns of the Southern Uplands were not so well situated as places near coalfields such as the Yorkshire centres, and so the industry has never grown to the same extent as it has in Yorkshire. It still flourishes, however, the chief centres engaged in the woollen industry being Hawick, Galashiels, Selkirk, Peebles, and Dumfries.

If you look at the map you will see that the most easterly county of the Southern Uplands is Berwick and the most westerly is Wigtown. The industries in these two counties form an interesting contrast for they are determined to a large extent by the situation of the two districts. We have already seen that the west coast has a much greater rainfall than the east. In Wigtownshire, therefore, we find rich pasture land, very suitable for rearing cattle, and this county has consequently become famous for dairy farming. On the other hand, the dry sunny climate of Berwickshire is good for grain growing, and so we find much wheat and barley grown in the lower parts of this county.

The coast of the Southern Uplands is fringed with fishing villages. The east coast fishermen frequent the rich banks of the North Sea, and the west coast men are chiefly herring fishers. Fine hauls of salmon are obtained from the Solway Firth and from the Tweed, a famous salmon river.

Mining and quarrying are carried on in several parts of the Southern Uplands. Leadhills and Wanlockhead, on the borders of Lanark and Dumfries, are now the only parts of Scotland where lead is mined. It is a famous district for metals, and was once the seat of a flourishing gold-mining industry. The two places mentioned are the highest villages in Britain, being situated nearly 1500 feet above the sea. In Dumfriesshire there are large quarries of fine red sandstone, which is becoming very popular for buildings in all parts of Scotland. Granite is worked in the south of Kirkcudbright.

Of the towns on the western side of the Southern Uplands Dumfries is the most important. Woollen goods are made, but the town has grown chiefly because it is a very convenient trading centre for all the surrounding district. You will see from the map that Dumfries is better served with railways than any other town in the Southern Uplands. Through it runs the main line from Glasgow to Carlisle and the south. Quite a large number of passengers, too, pass through Dumfries on their way to Stranraer, for the route from Stranraer to Larne is the shortest sea-passage between Great Britain and Ireland. Dumfries is one of the towns most closely associated with Robert Burns. He had a farm called Ellisland, a few miles from the town, where much of his best poetry was composed. Later he took up his abode in Dumfries and died there.

Most of the woollen industry of Scotland is carried on by the towns in the valley of the Tweed. Hawick, the largest town in this district, is the chief place in

Scotland for the making of hosiery. Tweed cloth is made as well, although Galashiels has a larger trade in this material. Tweed cloth does not take its name from the river as is sometimes supposed. The word is a corruption of "tweel," the local name for twilled cloth. Down the river from Galashiels is Abbotsford, the home of Sir Walter Scott.

Peebles, from the west

In the neighbourhood there are the ruins of several beautiful old abbeys of which Melrose (see p. 95) is the finest. Peebles, another town engaged in making woollen goods, has a beautiful situation on the river Tweed, and in former times was a favourite place of residence of many Scottish kings. There are two poems describing the sports at Peebles that are believed to have been written by James I of Scotland.

18. THE CENTRAL PLAIN. PART I

In a former chapter we learned that the Central Plain lies between the Southern Uplands and the Highlands, and that the boundaries are two lines, one running from Stonehaven to Helensburgh, and the other from Dunbar to Girvan. The Central Plain does not consist entirely of low-lying ground. There are several hill masses, the chief being the Sidlaw Hills, the Ochil Hills, the Campsie Fells, the Kilbarchan Hills, and the Pentland Hills. These hills are all flat-topped, in other words they are all plateaus. It is not difficult to see why this is the case if you remember what was said in the previous chapter about volcanoes. The hills of the Lowlands are merely the remains of great sheets of volcanic rock which originally extended over a much wider area. The Ochil Hills, for example, consist of a great slab of solid lava some 20 miles long, 10 miles broad, and 2000 feet high. Think of this slab made rough, uneven, and furrowed, by rain, frost, and rivers, and you have a correct idea of the Ochil Hills.

None of the great rivers of Scotland lies entirely within the Central Plain. The Tay and the Forth both flow for some distance in the Highlands before entering the Lowlands. The upper course of the Clyde is in the Southern Uplands. But the lower parts of all these rivers are much the most important, at least for commerce, for all the large towns on their banks are situated in the Lowlands.

Almost all the trade of Scotland is carried on in the Central Plain. There are many reasons for this.

The land is flatter, and so it is much easier to make roads, railways, and canals. Most of the agriculture of Scotland is carried on in the Lowlands, for the soil is richer, and the weather is warmer and drier than in most parts of the Highlands and the Southern Uplands. But the main cause of the commercial importance of the Central Plain is that the coalfields of Scotland are all situated there. From a map you will see that all the large groups of towns in the Lowlands are clustered near the coalfields.

We shall now describe certain parts of the Lowlands in detail, beginning in the west with the Ayrshire Plain. The industries of Ayrshire are very well balanced. Agriculture, manufacturing, mining, and fishing are all carried on to a large extent. The dry, sandy soil of the Ayrshire coast is very suitable for potato-growing, and therefore many of the Ayrshire farmers have been successful in growing early potatoes. In the north of the county dairy-farming is the chief branch of agriculture followed. In this branch, too, the farmers are very successful, for they have always been ready to adopt new ways of doing things if they seemed better than the old methods.

The county town is Ayr at the mouth of the river Ayr. It is like Dumfries in being the market town for quite a large area round about. It resembles Dumfries, too, in its memories of Robert Burns, who was born at Alloway, two miles south of Ayr. The cottage where he was born is preserved in the same condition as when Burns was alive. The old kirk-yard of Alloway is the scene of *Tam-o'-Shanter*, considered by many to be the finest poem Burns ever wrote. Many of the great deeds of William Wallace, Scotland's greatest hero, were done in the neighbourhood of Ayr.

Kilmarnock is the largest town in Ayrshire. It is the chief manufacturing centre, for it can obtain plentiful supplies of coal and iron. It has quite a number of industries, but the most important is engineering. The town possesses the great advantage of being on one of the two main railway lines between Glasgow and Carlisle. A few miles west of Kilmarnock is the seaport town of Irvine, which makes chemicals and has ironworks. Just north of it is Nobel's factory for making explosives, the greatest of its kind in Britain. It is not one great building, but consists of a large number of separate buildings, hidden among the sandhills of the coast, so that if an explosion should take

Burns's cottage, Ayr

place as little harm as possible would be done. The low sandy coast of Ayrshire with its clean beach has led to the growth of a large number of little towns for summer visitors. The Ayrshire coast, too, is one of the most famous golfing districts in Britain.

Ardrossan and Ayr are the chief seaports of the county. Ardrossan is a good example of a town rising to importance, not so much owing to its position as to human influence. It was a tiny place until, at the beginning of the nineteenth century, the earl of Eglinton, the chief landowner in the neighbourhood, determined to make it a seaport. The place has not grown as he expected, because Glasgow not long after made the Clyde navigable and so took most of the trade, but it is a fair sized seaport. It imports chiefly timber, limestone, and iron ore, and exports coal and pig iron. It is a very important packet-station for fast passenger traffic, having sailings to several places on the Firth of Clyde and also to Irish ports. It is the headquarters, too, of part of the Clyde fishing fleet. The seaport town of Ayr is similar to that of Ardrossan, although it is, however, not nearly such a good centre for passenger traffic.

19. THE CENTRAL PLAIN. PART II

We shall pass over the counties of Lanark, Renfrew, and Dumbarton for the present, as we shall describe them later on, when dealing with the Clyde valley. We come next to Stirlingshire, which stretches between

Loch Lomond and the Firth of Forth. The county town is Stirling, which was for centuries one of the most important towns in Scotland. Both Stirling and Edinburgh may justly claim to have played a more prominent part in Scottish history than any other town. It was here that Wallace gained his greatest victory over the English; and the castle was the favourite residence of several Scottish kings, some of whom were born there. The town has always been considered as the military key to the Highlands.

There must be something specially significant in the situation of Stirling to have made it so important for such a long time. In the first place, the steep rock on which the castle was built makes a very strong position for a fortress, and round an important fortress a town always tends to spring up. Again, just at Stirling the river Forth can be forded easily, and so traffic was drawn to that part of the river. Stirling, too, for a long time was the lowest point at which the Forth was bridged. There is still another very important fact. To the north-east are the Ochil Hills, to the south-west the Fintry and Campsie Hills. All traffic is forced to go through the gap between these hill masses, and Stirling stands just in this gap. In this respect it strongly resembles Perth, and like Perth, too, Stirling is now a fairly important railway centre.

Of the industries of Stirling the manufacture of woollen goods is the chief. Blankets and carpets are made, and it is the chief centre of the manufacture of tartans. The view from Stirling Castle is one of the most impressive in Scotland. The flat ground in the fore-ground over which wind the silver links of the Forth makes a striking contrast to the line of blue mountain peaks in the distance forming the edge of the Grampian Highlands. A couple of miles south of Stirling the battle of Bannockburn was fought.

Falkirk is the largest town in Stirlingshire, and the chief industrial centre. Its principal industry is iron-founding, that is, the casting of iron objects by pouring the molten metal into moulds. Carron, a few miles from Falkirk, has been famous for this industry for a long time. It used to make large quantities of cannon and shell, indeed the word carronade is derived from the name of the place. Near Falkirk took place the disastrous battle in which Sir William Wallace, in spite of his skill and bravery, was completely defeated by Edward I. A second battle of Falkirk was fought during the '45 Rebellion, when the Jacobites repulsed the royal troops. Near Falkirk can be seen traces of Antonine's Wall. This was a broad, turf rampart on a stone foundation built by the Romans right across Scotland between the Firth of Clyde and the Firth

Stirling Castle

of Forth. At intervals along the wall there were forts, the ruins of which have been dug up. A great many interesting Roman remains have been found in these places.

A few miles east of Falkirk is the busy seaport of Grangemouth, which stands on the southern shores of the Firth of Forth. As its position would lead one to expect, the port has a brisk trade with the Continent. Timber, ore, flax, and grain are a few of the many things that are imported. The trade of the port is benefited by the fact that it stands at the east end of the Forth and Clyde Canal.

20. THE CENTRAL PLAIN. Part III

When we were talking of the Southern Uplands in a former chapter we found that the eastern part grew much grain, while the western part was famous for dairy produce. Exactly the same thing holds good for the Central Plain, and the cause is just the same. Crops are grown on a much greater proportion of the land of the eastern counties of the Central Plain than of the west. Indeed more of Fife and Haddington is cultivated than of any other counties in Scotland. Again, taking wheat-growing as an example, we find that Fife, Haddington, Edinburgh, and Linlithgow grow most wheat in proportion to their size, and all these counties are in the east of the Central Plain. On the other hand Renfrew in the west has more cattle for its size than any other county in Scotland. We have already seen that the cause of this striking contrast between east and west is largely the difference in climate.

Most of the peninsula between the Firth of Forth and the Firth of Tay is occupied by the county of Fife, west of which are the two little counties of Clackmannan and Kinross. The land on the whole is flat and well suited for farming, but in the west are the Ochil Hills, which rise to more than 2000 feet above the sea. The scenery is very pretty and the air bracing, so that little inland holiday resorts are found here. In the east of the peninsula isolated hills rising suddenly from the plain are very common. These are volcanic rocks, and more than fifty of them can be seen between Leven and St Andrews. Largo Law is probably the one that is best known. The only lake of any importance is Loch Leven; and on an island in the lake is Loch Leven Castle, where Mary, queen of Scots was imprisoned after her defeat at Carberry.

Coal is found in Fife and is exported from several seaport towns. In recent years Methil has become a busy place because of its large exports of coal. The presence of coal, too, has fostered the growth of a number of manufacturing towns. Kirkcaldy is noted for its manufactures of floor-cloth and linoleum, of which it makes more than any other town in Britain. The town is also a busy seaport. The famous writer, Adam Smith, was born in Kirkcaldy, and wrote his best known book there.

Dunfermline manufactures fine linen of high quality. In the making of table cloths, table napkins, and towels, of damask, that is, fine linen beautifully figured, Dunfermline has no rival in Scotland. The town has played an important part in Scottish history. The palace was a favourite royal residence, and its burial ground holds the remains of eight Scottish kings. The old abbey is still very beautiful. Alloa, in Clackmannan, has large breweries and distilleries; it is noted also for its woollen goods, especially hosiery.

The Fifeshire coast is one of the favourite holiday resorts of Scotland. While the interior of the peninsula is rather flat and uninteresting, the coast is very beautiful. It is the home of golf, too, and this brings thousands of visitors every summer to the watering-places of Fife. Quaint, little towns with picturesque harbours crowded with fishing boats fringe the coast and attract many artists. Of the sea-coast towns St Andrews is the most important. It throve chiefly because of its connection with the Church. Before the Reformation the archdeacon of St Andrews was the chief churchman in Scotland. The University of St Andrews, founded in 1411, is the oldest in Scotland. Many of the chief events connected with the Reformation in Scotland took place in St Andrews. The golf links of the town are the most famous in the world, and the Royal and Ancient Golf Club lays down the law to golfers in all countries.

North of the Tay the largest town is Dundee. In size this city takes third place in Scotland, ranking after Edinburgh. It is situated on the north shores of the Firth of Tay, and is connected to Fife by the Tay Bridge. Dundee is the chief seat of the manufacture of jute; and in addition coarse linen goods are made, and jam and sweets are manufactured. Much of the fruit used in the jam-making comes from the neighbouring Carse of Gowrie. Sweets are made in winter in the same works as make the preserves. The shipbuilding yards on the Tay turn out every year about 20 or 30 moderate sized steamers. Dundee used to be the chief headquarters of the whale-fishing fleet, but this industry is now almost extinct. Arbroath and Montrose also have factories for the making of coarse linen. These linen towns are situated on the east coast because of their nearness to the Continent, from which comes the supply of flax. Practically all the coast towns are engaged to a greater or less extent in fishing.

Jute warehouse, Dundee

South of the Firth of Forth the east of the Central Plain is occupied by the counties of Linlithgow, Edinburgh, and Haddington. These three counties form the district called the Lothians, and the separate counties are sometimes known as West Lothian, Midlothian, and East Lothian. The Lothians consist of a broad band of low ground stretching east and west along the south shore of the Firth of Forth. Only in the south does the ground rise into the Pentland Hills, the Moorfoot Hills, and the Lammermuir Hills. The broad band of low ground affords an easy route from England to the heart of Scotland, and so we find this part of the country associated with many events in Scottish history. For example, the battles of Dunbar, Prestonpans, Carberry Hill, and Pinkie all took place in the Lothians. In modern times, the eastern lowland strip of Scotland is used by one of the main railway lines between England and Scotland.

The Lothians form one of the best agricultural districts in Scotland, and the farmers of this region are famous for their skill and enterprise. The climate, too, is more favourable than in most parts of Scotland, for there is less rain and more sun. In wheat-growing, for example, if we make allowance for the size of the county, we find that although Fife is first, the three counties of the Lothians take second, third, and fourth places. The three counties of the Lothians, too, obtain a greater yield of wheat to the acre than any other counties in Scotland. It must not be forgotten, however, that a much greater area is given to oats than to wheat. Turnips also are grown to a large extent.

The Lothians are not only rich farming lands, but contain fair supplies of minerals. Coal is mined in

Midlothian, although the field is not very large. The output of this county is less than a third of that of Lanarkshire. The most interesting mineral is oil-shale, a substance which looks something like slate, but it is much softer, and has a brownish, greasy appearance. When the oil-shale is strongly heated paraffin oil and other substances can be distilled from it. In this way there are obtained not only paraffin oil, but paraffin wax for candles, petrol (for motor cars), and ammonia. The making of paraffin oil from shale is a typical Scottish industry, and is now in a very flourishing condition. The chief centres are Bathgate and Broxburn, both in Linlithgow.

Edinburgh is the chief town of all this district, but it will be described in detail in a later chapter. The town of Linlithgow has many interesting historical associations. Linlithgow Palace was for a long time a favourite residence of the Scottish sovereigns. James V and his daughter Mary, queen of Scots were born there. It was while riding through the long street of Linlithgow that the Regent Moray was killed by a shot from an enemy hidden in a house overlooking the line of march. After Edinburgh, Leith in Midlothian is the largest town in this district. In size it takes sixth place among the towns in Scotland, and as a seaport ranks next to Glasgow. As might be expected from its position, most of the trade is carried on with the continent of Europe and chiefly the ports of the Baltic and the North Sea. Shipbuilding, engineering, the making of sails, ropes and other articles for ships, and many other trades are carried on in the town. Leith is now quite continuous with Edinburgh. There are no other towns of any great commercial importance, but along the coast there is a large number of watering places and golfing resorts much frequented in summer. Dunbar and North Berwick are examples of such towns.

Room in which Mary Stewart was born, Linlithgow Palace

21. UPPER CLYDE

Although it is not the largest river in Scotland the Clyde is by far the most important. Its firth is the gateway to one of the great industrial regions of the world. Near its banks there live more than one-third of all the people in Scotland. There is no other river in Britain which shows such strange and violent contrasts in its course from its source to the sea. From its source for many miles it flows through the Southern Uplands, a pure mountain stream among lovely hills. After issuing from the hills it flows through breezy moors till it enters the ravine above the Falls of Clyde. Below the Falls it reaches the fruit belt. Here the river banks form one great orchard, and the rich luxuriant scenery is very different from the wild, bleak surroundings of the upper river. Soon the orchards are left behind and the river enters the "black country" of Lanarkshire. The air is darkened with the smoke from innumerable chimneys, and foundries, mills, engineering-shops, and ship-yards roar about its banks till it escapes at last and finds rest in the clean, salt waters of the firth.

None of the upper waters of the river is called the Clyde, but the most important head stream rises on the slopes of Gana Hill on the southern border of Lanarkshire, and this may be taken as the source of the Clyde. The upper valley of the Clyde forms one of the easiest routes across the Southern Uplands, and so the river, the road, and the railway keep close company all the way to Glasgow. Many centuries ago this easy route had been discovered by the Romans, and traces of their road can still be clearly seen.

From the headquarters of the Clyde particles of gold can be obtained, and at one time hundreds of gold-miners sought for the precious metal in this district. The early Celtic tribes made ornaments of gold, and the metal must almost certainly have come from this district. In the sixteenth century crowns for the king and the queen of Scotland were made from the gold of upper Clydesdale, and these can still be seen in Edinburgh Castle. In the reign of James I a famous miner called Bevis Bulmer brought 300 men to Lanarkshire, and worked the gold for three years. In that time gold to the value of £100,000 was obtained. During the last three hundred years there have been no workings on a large scale. The miners, however, still turn out on special occasions, such as the marriage of one of the family of the Earl of Hopetoun, who owns this district, and obtain enough gold to make the wedding ring.

Upper Clydesdale is dotted over with pleasant, little villages to which many people come in summer for golf, fishing, and the pure moorland air. From Tinto Hill in this part of the valley a wonderful panorama can be seen on a fine day. The eye can pass from the Bass Rock to Arran and from the Grampians to the peaks of Cumberland. Near this part the Clyde valley approaches within a mile of the Tweed, from which it is separated only by a low pass. In times of heavy flood, indeed, the waters of the Clyde and Tweed mingle. You probably know that rivers sometimes change their courses. It is believed that long ago the Clyde made a very startling change in its course, for it probably flowed in the opposite direction; that is, it came from the Western Highlands and flowed south-east to join the Tweed, thus making the low valley between the Clyde and the Tweed which is now abandoned.

Half-way down the Clyde stands the old historic town of Lanark. It is always associated with the name of Sir William Wallace. To avenge the death of his wife he killed the governor of the town, and so had to take the field against the English. The last stages in the great patriot's life, too, are associated with Clydesdale. He was betrayed at Rutherglen, and finally captured a few miles from Glasgow. In later times the Covenanters were strong in this district, and two of the best known engagements took place in Clydesdale. At Drumclog, Claverhouse and his dragoons were repulsed by the Covenanters, while at Bothwell Bridge the latter were utterly routed by the royal troops.

Near Lanark are the famous Falls of Clyde. There are three separate falls of which the best known is Cora Linn. Below this fall the sides of the river valley for some distance are dark precipices over a hundred feet in height. A river gorge of this kind is nearly always found below a waterfall. It is due to the fact that a fall always eats its way backwards through the rock. The length of the gorge below the fall therefore shows how far the waterfall has shifted backwards since it was formed.

The river valley for some distance below the falls forms one of the chief fruit-growing districts of Scotland. Apples, pears, and plums of the finest quality have been grown here since the beginning of Scottish history, and in recent years great quantities of strawberries have been cultivated. Of this fruit Clydesdale produces more than double the quantity raised in Perthshire, the other great fruit district of Scotland. Quite the latest fruit to be introduced into this district was the tomato, but its cultivation has spread with great rapidity.

Falls of Clyde—Stonebyres Linn

At the end of the fruit-growing district stands

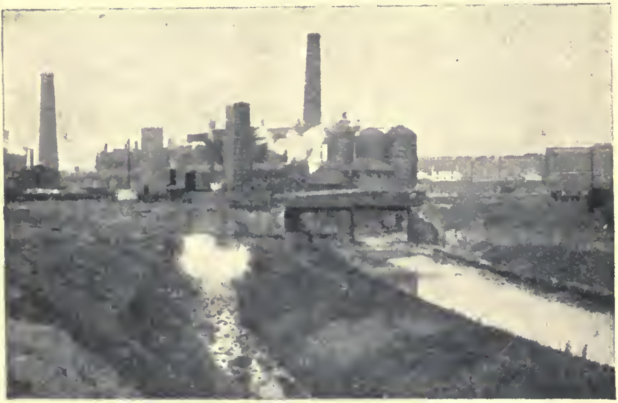
Bothwell Castle, one of the finest ruins in Scotland. In places the walls are sixty feet in height and more than fifteen feet thick. Round the red towers of the castle linger memories of some of the most famous names in Scottish history. Edward I and Edward III of England both lodged within its walls. One of its owners was James Hepburn, earl of Bothwell, who married Mary, queen of Scots. Not far away is the birthplace of Scotland's greatest explorer, David Livingstone.

22. MIDDLE CLYDE

We come now to the "black country" of Scotland. The middle Clyde valley is by far the most important industrial centre in Scotland. This is due chiefly to the presence of valuable coalfields of large extent and fine quality. These coalfields stretch down the Clyde as far as Glasgow, and so the manufactures of the Clyde valley can be easily shipped and sent to all parts of the world. The towns of this district illustrate very well the importance of being on a coalfield, for many of them a hundred and fifty years ago were only tiny villages, whereas now they are great industrial towns.

The west of Scotland is one of the most important iron producing districts in Britain, ranking second only to Cleveland in this respect. Coatbridge is the chief centre for the smelting of iron, and possesses more than half the blast furnaces of Lanarkshire. In addition to the making of pig iron there are steel works and rolling mills. Boilers, tubes, and heavy metal goods of all kinds are made. Just two miles from Coatbridge is Airdrie, a town with similar industries. There are foundries and engineering shops, and the town is surrounded by coal-pits. Although now a large and prosperous town, until the rise of the coal industry Airdrie was a mere hamlet.

Motherwell is also entirely a product of the nineteenth century, as on its site there was previously not even a village. It stands on the north bank of the Clyde, just over a mile from the river. It is one of the chief steel centres of Britain. Several works are engaged in making ingots, sheets, bars, rails, girders, boiler plates, and every conceivable article of steel. The making of roofs and bridges is a speciality, and so also is the manufacture of cranes. The town lies on the main Caledonian line to England and is an important railway centre. Across the Clyde, face to face with Motherwell,



Ironworks, Coatbridge

is Hamilton. The town is surrounded by coal-pits and many of the inhabitants are engaged in coal-mining. Near the town is Hamilton Palace, the residence of the duke of Hamilton. Another important coal town in this neighbourhood is Wishaw. Sixty years ago it was a village, while now it is one of the chief coal centres of the kingdom.

23. LOWER CLYDE

The best way of learning the geography of lower Clydesdale would be to go on board a boat at Glasgow, and sail down the river and out into the open waters of the Firth of Clyde. Let us imagine that we are taking such an excursion. At the harbour we go on board a swift and handsome paddle-steamer, and soon the ropes are thrown off and the boat churns its way into mid-stream. On both sides the Glasgow wharves stretch for a long way, and along the quays are moored ships that sail to every corner of the globe. Here are the Channel steamers that cross to Ireland, and the boats for Liverpool or London. Next we see the great liners that go to and from America with the regularity of a ferry boat. Now we obtain a peep into the mouths of docks where all sorts and conditions of shipping are huddled together: East Indian liners, graceful four-masted Australian clippers, "tramp" steamers ready to go to any corner of the ocean for a cargo, and rusty "wind-jammers" laden with nickel ore from far-off lands.

Now we hear a distant rattling noise, and soon the air is full of the never-ending, deafening clangour of hammers on metal, for we are entering the greatest shipbuilding district in the world. On both sides of the river we see the bare steel skeletons of what in a few months' time will be noble ships. Presently we leave Glasgow behind us, and green meadows stretch away on both sides. We pass Renfrew on our left, famed for dredgers, and then on our right, eight miles from Glasgow, we see Clydebank, a town which is growing at an amazing rate. Lower down, we pass the old historic rock of Dumbarton with the town behind it that was the capital of the ancient British kingdom of Strathclyde. Dumbarton, too, is noisy with shipbuilding yards, and the sound of the hammers is repeated from the other side of the river, where Port Glasgow and Greenock lie under a thick smoke haze.

We are now at the end of the river and the beginning of the firth. The water is clean and salt, the smoke pall of huge factories has disappeared, and the mountains of the Highlands form the background of the scene. From the northern shores a number of long and narrow sea-lochs run far inland, the mountains on each side running steeply down to the water. For beautiful and varied scenery no other river mouth in Britain can rival the Firth of Clyde.

Of the lochs the two largest are Loch Fyne and Loch Long. The shores of the lochs and the islands are dotted with little, coast towns that in a sense may be considered as suburbs of Glasgow and the other large industrial centres of the district farther up the Clyde. Dunoon and Rothesay are the largest of these watering places. Sailing past Dunoon we come in sight of the islands of the firth. On the right is Bute, on the left the Cumbraes, and beyond them the coast town of Largs, where in 1263 the fleet of the Norwegian King Haakon was destroyed at the battle of Largs. Still farther down the firth is the beautiful island of Arran, with jagged granite peaks, and deep and lonely glens.

Let us now turn back and take a closer look at the towns we passed in sailing down the river. Renfrew is an old town which cradled the Stewart kings, for it was the chief seat of Walter, the High Steward of David I of Scotland, an ancestor of the royal house of Stewart. It is now a busy engineering centre, builds more dredgers than any other town in the world, and has the largest boiler works in Britain.

Brodick Bay and the Arran Hills

Three miles inland from Renfrew is the large town of Paisley, the fifth in Scotland for size. Like many other towns, it owed its origin to a settlement of monks, who founded a powerful abbey round which the town grew. It has long been noted for spinning and weaving, and although the making of Paisley shawls is no longer carried on, these articles were one of the greatest triumphs of the weaving industry. Paisley is now famous for its cotton thread, of which it produces more than any other town in the world. There are many engineering works as well, which may be said to specialise in machine tools. Every possible kind of tool is made. There are machines for punching, for shearing, for rolling, for bending, for drilling, for tapping, for cutting, for flangeing, for sawing—in fact for every conceivable process known to the engineer. A few miles from Paisley, at Elderslie, is the birthplace of Scotland's greatest warrior, Sir William Wallace.

It will teach us a useful lesson in geography if we notice that there are neither blast furnaces nor steel works in the Clyde valley below Glasgow. This is because this district is situated some little distance from rich coalfields, and so the industrial towns are at a disadvantage in the crude processes of metal working where large quantities must be turned out at a small cost. The cost of carriage of the coal is too great a handicap. This applies to every country. Wherever the source of power is not in the immediate neighbourhood we find that the amount of skill and labour expended on the articles produced is large compared with the cost of the raw material. The fact that Paisley specialises in costly machine tools is a good illustration of this principle.

In recent years Clydebank has grown more rapidly than any other town in Scotland. It is entirely engaged in shipbuilding and engineering, and some of the largest boats in the world have been built here. It also contains enormous sewing-machine factories. Lower down the river is the old town of Dumbarton, which stands where the Clyde is joined by the Leven, which issues from Loch Lomond. As far back as the sixth century Dumbarton was the capital of the British kingdom of Strathclyde, which extended from the Clyde to Westmorland. We have already seen how the town grew up round the steep volcanic rock. The castle played a prominent part in Scottish history, particularly during the War of Independence. The chief industry of Dumbarton is shipbuilding.

The name of Port Glasgow indicates its origin. Before the Clyde was deepened, Glasgow felt the need of an outlet for her manufactures by sea. A piece of land was therefore purchased and a harbour and houses were built. The town grew rapidly as a shipping centre, but when the Clyde was deepened as far as Glasgow it seemed as if Port Glasgow would completely decay, for the ships preferred to land their cargoes higher up the river. But the inhabitants applied all their energy to shipbuilding and similar trades, and the town is now the greatest shipbuilding centre on the Clyde.

Greenock ranks next to Glasgow among the Clyde seaports. There is a fine description of it (and indeed of all the Clyde towns) written by a well-known poet:

> "this grey town
> That pipes the morning up before the lark
> With shrieking steam, and from a hundred stalks
> Lacquers the sooty sky; where hammers clang
> On īrōn hulls, and cranes in harbour creak,
> Rattle and swing, whole cargoes on their necks."

Greenock, from the river

Greenock is a good example of towns that owe their growth to human influence. At the beginning of the eighteenth century it was a village engaged in herring fishing. By his own exertions, however, the principal proprietor of the district caused a harbour and quays to be built, and the place grew rapidly as a seaport. The son of the first "laird" continued to work on behalf of the town, and new quays and docks were built. The town is now not only a large seaport but a great shipbuilding centre, and the most important sugar-refining town in Scotland. The famous James Watt was born in Greenock.

24. EDINBURGH

We shall now describe in some detail the two most important cities in Scotland, Edinburgh and Glasgow. They are of interest in quite different ways. Edinburgh is an example of a town that has played the leading part in the history of a nation, while Glasgow illustrates the causes that make a city great as a commercial centre. The situation of Edinburgh was described in a former chapter, and we saw that there were two main causes that led to its growth, first, the steep rock offered a fine position for a strong castle round which the town grew, and second, the town stands in a strip of low land near the east coast which forms an easy route for traffic.

The site of Edinburgh is very beautiful. The town is built on a number of hills, of which the best known are the Castle Hill and Calton Hill. Overlooking the town on the east is the fine hill of Arthur's Seat and its neighbouring crags. Then within easy reach of the town are the Pentland Hills with their breezy slopes and pretty glens. The situation of Edinburgh on a number of hills and the nearness of the city to the sea give it a resemblance to the capital of Greece, and so it is sometimes called the "Modern Athens," but of the two towns Edinburgh has the finer situation. Many famous writers have written of the beauty of the town. One of them—Alexander Smith—says "Hill, crag, castle, rock, blue stretch of sea, the picturesque ridge of the Old Town, the squares and terraces of the New—these things, seen once, are not to be forgotten. The quick life of to-day sounding around the relics of antiquity, and overshadowed by the traditions of a kingdom, makes residence in Edinburgh more impressive than residence in any other British city."

The contrast just mentioned between the old town and the new is very striking. The streets in the old town were very narrow and the houses were tall. Each succeeding flat was built out a little into the street, so that the inhabitants of opposite sides of the top flats could often shake hands across the street. The reason for building the houses of the old town to such a height is interesting. Edinburgh in former times was a walled town, and after the disastrous battle of Flodden, in 1513, the inhabitants were afraid to build houses outside the city wall. The town was growing rapidly, however, and since it could not spread out over a greater area it was forced to rise into the air. Lofty tenements or flatted houses were therefore built, sometimes containing as many as eleven "stories" or flats in height.

A walk along High Street, in Edinburgh, gives one a good idea of what the town looked like in former times. We shall not obtain the proper impression, however, unless we remember that in the "good old days" we should have to pick our way along the narrow street among dirt and filth of every description. The narrow "closes" and "wynds" of the High Street and the Canongate gave access to the houses of the titled and wealthy citizens. Almost every house is associated with the name of some famous person. The most interesting of all the old houses is the one where John Knox lived, which shows very well the appearance of these old dwellings. A few of the other well-known men who lived in the High Street or its continuation were Allan Ramsay, David Hume, Adam Smith, and Sir Walter Scott.

Of the old buildings the castle is the most interesting. There was probably a castle of some kind on the rock in the days of the early Britons. In the long wars between the English and the Scots, Edinburgh Castle played a prominent part. It was taken first by one side and then by another, and many are the thrilling stories told about its captures. The Crown Room of the castle contains the ancient regalia of Scotland, including the crown, the sceptre, the sword of state, and other interesting relics. A garrison of soldiers is still kept in the castle and they give the place a warlike look that seems very fitting when we know its history.

After the castle, perhaps the most interesting place is Holyrood, which has both a palace and an abbey. In the twelfth century an abbey was founded there and took its name from the "rood" or holy cross. Soon it became one of the richest and most splendid churches in the kingdom. There were rooms kept for royal guests and later on a splendid royal palace was built. James II, James III, and Mary of Scotland were married at Holyrood, Rizzio was dragged from Mary's side and murdered on a stone stair in the palace, James VI was living there when he was summoned to the throne of England, and Charles I was crowned king of Scotland there. Of the other ancient buildings the Old Tolbooth or prison has disappeared. Sir Walter Scott made this building famous under another name—the Heart of Midlothian. Its site is still marked by a heart formed in the ground of paving stones.

Edinburgh Castle

Edinburgh has always been famous for its interest in education. There are more first-class schools there than in any other city in Britain. The University was founded by James VI in 1582. It has a world-wide reputation for its medical teaching. There are many fine libraries in Edinburgh. The Advocates' Library is one of the few libraries which must receive a copy of every book published in Great Britain. Since Edinburgh is the capital of Scotland the chief law-courts are situated there. This is why the names of so many famous lawyers and judges are associated with the city.

Edinburgh has long been noted for its printing and publishing trade, and this has been helped to a large extent by the presence of the law courts. When they are sitting an enormous amount of printing has to be done, requiring the work of many skilled men, and when the courts are not sitting these men are available for the ordinary branches of printing and publishing. More than any other city, too, Edinburgh has been famed for the publication of high-class magazines and reviews. The printing trade has been helped by the abundance of water to be obtained in the neighbourhood. Another industry in Edinburgh that has been influenced in the same way is the brewing of beer and the distilling of whisky. For these industries an abundant supply of good water is a necessity.

25. GLASGOW

Glasgow is by far the largest and most important commercial town in Scotland. Quite recently it has joined to itself several suburbs, and the city has now over a million inhabitants and in size takes second place only to London. Its rapid growth has been due largely to its favoured position. Scotland is more easily crossed between the Clyde and the Forth than at any other place, and, therefore, there has always been considerable traffic between Glasgow and the east coast. Again, one of the easiest routes across the Southern Uplands is the road that comes over Annandale and down Clydesdale to Glasgow. The fertile Ayrshire plain is separated from the Clyde basin by a ridge of volcanic hills. This ridge, however, is cut through in two places, and these valleys point towards Glasgow. The Western Highlands are practically shut off from the Lowlands by land, but they are easily reached by sea, and the natural route from the west is up the Firth of Clyde and so into the heart of the Lowlands at Glasgow. Thus we see that Glasgow occupies a very fine position for commerce, since so many trade routes have their natural centre at the city.

Like so many other towns, Glasgow took its rise from a settlement of monks. St Kentigern (more generally known as St Mungo, or the loved one), the patron saint of the city, settled near the banks of the Clyde in the sixth century. In the beginning of the twelfth century the early church was replaced by a cathedral. Of the present building the earliest part was erected towards the end of that century. The outside is simple to the point of bareness, but part of the interior is magnificent. The details are very beautiful and rich. At the Reformation most of the beautiful, old churches were partially destroyed in the mad rage of the people against the old faith. Luckily the trade guilds of the city rose in arms and protected the building, and so Glasgow cathedral, almost alone of all the cathedrals of Scotland, escaped untouched. It was on the outskirts of Glasgow that the army of Queen Mary was finally defeated by the forces of Regent Moray, acting for the young King James VI. The battle of Langside ruined completely Mary's hopes of success in Scotland. Prince Charlie, the young Pretender, spent the last few days of 1745 in Glasgow, a most unwelcome guest. He secured only sixty recruits for his army, and

Glasgow Cathedral

these were the scum of the town. Indeed, the provost of the time maintained that his only new follower was "ane drunken shoemaker." The prince angrily threatened to sack and burn the town.

It was not till after the union of the parliaments that Glasgow became an important commercial centre. The ports of England and the English colonies were now for the first time thrown open to Scotland, and soon Glasgow's colonial trade was of considerable importance. It became a great centre of the tobacco trade. During the latter half of the eighteenth century more than half the tobacco imported into the kingdom was brought to Glasgow, and made the fortunes of the "tobacco lords," who strutted in their scarlet cloaks on the "plain-stanes" of the Trongate.

It was in the nineteenth century that Glasgow came rapidly to the front as a great manufacturing centre. It was only then that the coalfields of Britain began to be developed, and of course Glasgow had a particularly good situation just where the Lanarkshire coalfield came nearest to the sea. The town rapidly developed as a great engineering centre. It is impossible even to name all the branches of manufacturing based on iron and steel. There are numerous foundries producing castings which vary in size from the parts of a model engine to the gigantic cylinders of a battleship. Boilers of all kinds are made, land and marine engines, cranes, pumps, steam-hammers, winding engines, sugar-machinery, and innumerable other kinds.

The building of locomotives is an important branch of engineering. More locomotives are built in Glasgow than in any other town in Europe, and Glasgow engines can be seen in every quarter of the globe. Roof and bridge work is largely carried on. Those wonderful structures, the Tay Bridge, the Forth Bridge, and the Tower Bridge of London were built by a Glasgow firm. It was Lord Kelvin's long connection with Glasgow that made the city famous for the making of scientific instruments. It was one of his inventions that made it possible to send telegraphic messages across the Atlantic Ocean.

Cotton spinning is largely carried on in the city. Muslins and curtains are produced on quite a large scale. Woollen goods are made to some extent, but the chief branch of the woollen trade is the making of carpets, which have obtained a great reputation for high quality and fine design. There is some silk making. Handkerchiefs, ties, chiffons, and other light materials are the chief articles produced.

Glasgow is much the largest seaport in Scotland. Among the ports of Britain it generally ranks fourth, being surpassed by London, Liverpool, and Hull. The imports are chiefly food stuffs, namely wheat and flour, animals and meat. The exports, as might be expected, are mainly machinery and iron and steel goods. But Glasgow was not always a seaport. The townspeople have a very true saying that "Glasgow made the Clyde, and the Clyde made Glasgow." In the middle of the eighteenth century there were twelve shoals between Glasgow and Renfrew, one of which was only fifteen inches deep at low water. Where now great ocean liners sail in safety, in those days people could wade across the river without wetting their knees. It was an

Englishman, a man from Chester, who first showed the Glasgow people how to deepen their river, and under his system the depth soon became fourteen feet. A great advance was made when steam dredgers were built, and now the bottom of the river is practically level from Glasgow to the beginning of the firth.

Two of the greatest names in science are connected with Glasgow, namely James Watt and Lord Kelvin. Kelvin lived in the city for nearly seventy years, and his long series of brilliant discoveries made the name of his university famous throughout the world. The university itself is one of Glasgow's finest buildings. It was the second university in Scotland and was founded in 1450. The engineering classes are more important than in most universities, and many foreigners come to Glasgow to study naval architecture, or, in simple language, to learn how to build ships. James Watt came from Greenock to Glasgow in 1754. Steam engines had been invented before his time but they were clumsy and inefficient. Watt was given a model of one to mend and this turned his mind to the improvement of the steam engine. He was walking over Glasgow Green one day thinking over the problem, when a brilliant idea flashed into his mind, and the result was Watt's improved steam engine, one of the greatest discoveries in the history of the world.

Of the many other famous men associated with Glasgow we can only mention one or two. Sir John Moore and Colin Campbell were famous generals who were born in Glasgow. Thomas Campbell, the author of *Ye Mariners of England*, was a Glasgow man, and all his life had a strong affection for his native city. "I was better pleased," he said, "to look on the kirk-steeples and whinstone causeways of Glasgow than on all the eagles and red deer in the Highlands." Alexander Smith was not born in Glasgow but he was educated and went to work there. One of his verses on the city is worth quoting.

"Draw thy fierce streams of blinding ore
Smite on a thousand anvils, roar
Down to the harbour bars;
Smoulder in smoky sunsets, flare
On rainy nights, with street and square
Lie empty to the stars.
From terrace proud to alley base
I know thee as my mother's face."

26. RAILWAYS

Roads and railways are so much a part of our everyday life that we never stop to think how inconvenient it would be if we could not get from one place to another by road or by rail. Yet it is not so long since there were no railways and hardly a good road in the whole country. It was in 1829 that George Stephenson's *Rocket* showed that steam engines could be used for carrying passengers. Again, until little more than a hundred years ago good roads were unknown in this country. Wheeled traffic was hardly possible, and most of the trade was done by pack horses. Ruts four feet deep were not uncommon, and in wet weather the roads were simply bogs. The condition of the roads explains why vehicles like sedan-chairs were so much commoner than coaches, in fact, the latter existed more because of their dignity than use. It was not until the middle of the eighteenth century that a stage coach ran between Edinburgh and Glasgow, and the state of the roads may be judged from the fact that its average rate was less than four miles an hour.

The routes from one part of a country to another depend on two things. First, if there is a strong need for communication between the places it is certain that some connecting route will be found. Secondly, the nature and the details of this route, the way in which it winds about and gets past difficult places, will depend on the physical features of the district. The most important railway lines in Scotland are those running between England and the two chief cities, Glasgow and Edinburgh. We shall describe one of these—the Glasgow and South-Western Railway—in some detail, for it shows very well how the line takes advantage of the easiest way of getting from one point to another. The route should be followed carefully on the map.

After leaving Carlisle the railway crosses the river Sark and enters Scotland. It skirts the flat shores of the Solway Firth and runs to Dumfries. Now between Dumfries and Glasgow there stretches the broad, mountainous region known as the Southern Uplands. How can the railway overcome this obstacle? Strange to say, the Southern Uplands are cut completely through by a valley, at the south end of which is Dumfries, and at the north end New Cumnock, in Ayrshire. This is the valley of the Nith, and the railway therefore runs up this valley and enters the flat Ayrshire plain, never having risen more than 700 feet above sea-level. The line now goes north through Ayrshire till it reaches Kilmarnock. Between Kilmarnock and Glasgow there is another range of hills forming the boundary between Ayrshire and Renfrewshire. These hills also are cut right through by a valley known as the Barrhead Gap, from the name of the town at its northern end. The railway, therefore, uses this gap as an easy way of crossing the hills, and then the line has a level road to Glasgow.

The other main lines from Scotland to England should also be traced. From Edinburgh the North British Railway takes the East Coast route by Dunbar to Berwick, where it joins the North-Eastern Railway. This line keeps to the low ground near the coast most of the way, except near St Abb's Head, where it makes use of a low inland valley in order to cross the easternmost spurs of the Southern Uplands. From Glasgow the Caledonian Railway runs up the Clyde valley as far as Elvanfoot, then crosses by Beattock Summit (1000 feet above sea-level) to the Annan valley, and so by an easy route reaches Carlisle, where it joins the London and North-Western Railway. Carlisle is connected with Edinburgh by a branch of the Caledonian Railway from Carstairs, and by a North British line which goes up Liddesdale, across the hills to the Teviot and the Tweed, up Gala Water, and passing west of Dalkeith, enters Edinburgh from the east. Because this line passes through districts that are closely associated with Sir Walter Scott it is often known as the Waverley Route.

Two very busy railways join Edinburgh and Glasgow, one a Caledonian line, the other a North British. The routes from the Central Plain to the north of Scotland are interesting in showing how valleys are used by railways, for the lines have to cross the Grampian Highlands. The Highland Railway starts from Perth and runs up the valley of the Tay. Then it makes use of two tributaries, namely, the Tummel and the Garry, passing on its way through the famous Pass of Killiecrankie. The highest point, 1500 feet above the sea, is reached at the Pass of Drumochter, between the Garry and the Spey. The line next runs for a long way down the Spey valley and then goes north-west to Inverness by rather a difficult cross-country route. A branch of the Highland Railway connects Inverness and Elgin. From Inverness the railway goes as far north as Wick.

The new Tay Bridge

Follow next on the map the West Highland line from Glasgow to Fort William and Mallaig. This was a very difficult railway to make. Beyond Bridge of Orchy the railway runs alone, for no main road goes across this district. Motor cars must go down Glen Coe and take the ferry at Ballachulish across Loch Leven, whence a direct road leads to Fort William. The east coast is served by a North British line, which, coming from Edinburgh and Glasgow, crosses the Firth of Forth and the Firth of Tay by the two famous bridges. Immediately after crossing the Tay Bridge the trains run into Dundee. From Dundee the railway keeps close to the east coast for most of the way to Aberdeen. Aberdeen and Elgin are joined by the Great North of Scotland Railway. There is, of course, a net-work of other lines which, however, are not important enough to be described in detail.

IRELAND

27. THE BUILD OF IRELAND

The seas that divide Ireland from Great Britain are fairly shallow, but to the west of Ireland the land sinks away into the great depths of the Atlantic Ocean. At one point Ireland comes very close to Scotland. From Fair Head to the Mull of Kintyre is only thirteen miles. You should verify this fact by measuring the distance on a map and then using the scale of miles. In many parts Ireland is mountainous, but it differs from Scotland in not having any great area of continuous high ground such as the Grampian Highlands or the Southern Uplands. On the whole the mountains of Ireland are arranged near the coast, leaving a great plain in the interior of the country. The high ground fortunately does not form a continuous rim round the coast, but is broken by many gaps, which give roads and railways an easy passage from the coast to the interior.

The highest mountains of Ireland are found in the south-west. Several high ridges run from west to east, and the whole group is called the Kerry Mountains. The highest mountain in Ireland, Carrantuohill (or

Carran Tual) is found in the Kerry Mountains. It is 3414 feet above the sea, that is, not quite so high as Snowdon but higher than Scawfell Pike, the highest summit in England. Not far away is the beautiful district of Killarney, famed for its lovely lakes. The scenery is not so wild and stern as that of many of the Scottish lochs, but it is more richly beautiful. The steep mountains that rise from the sides of the lakes are richly clothed with trees and flowering plants. There are many finely wooded islands, and several old historic ruins make the scenery particularly attractive. The Kerry Mountains are continued to the east by detached ranges also in an east and west direction. The chief of these are the Knockmealdown Mountains and the Galty Mountains, one of the peaks of the latter group being over 3000 feet high.

In the south-east is the granite mass of the Wicklow Mountains. These are mainly broad-backed, moorland hills that stretch from north to south for many miles. These hills are drained to the south by the beautiful valley of Ovoca. Farther north is another granite mass, the Mourne Mountains. In the extreme north-east of Ireland the high ground has a different character. It forms a great tableland called the Antrim plateau, the top of which is fairly level, but the borders face the sea in high and steep cliffs. The Antrim plateau was formed by the outpouring of great quantities of volcanic lava which cooled into horizontal sheets of hard rock. This happened again and again throughout many centuries until a huge plateau of solid rock was built up. It once stretched without a break to the

Scottish Hebrides, but much of it has sunk beneath the waves of the Atlantic Ocean. The sinking of part of the interior of the plateau has given rise to Lough Neagh. It is the largest lake in Britain but is nowhere very deep.

In the north-west of Ireland are the rugged Donegal Mountains. This is one of the wildest and most remote parts of Britain, and most of the people of this district still speak Irish. For the most part these hills are bare of trees, and dreary peat bogs occupy the majority of the valleys. Farther south, between Donegal Bay and Galway Bay, a mass of land eighty miles from north to south juts west into the Atlantic Ocean. This area is made up of hill masses, of which there are three main groups—the Sligo Mountains in Sligo, the Nephin Beg

On the Donegal coast
(*Showing a canvas curragh*)

Mountains in Mayo, and the Connemara Mountains between Clew Bay and Galway Bay. Achill Island, with its magnificent sea-cliffs, is merely a continuation of the Nephin Beg Mountains. The interior of Ireland is a great plain which in one part extends for over a hundred miles without a single hill of any size. Towards the south the dead level of the plain is broken by the Slieve Bloom Mountains, which are really the diminished outposts of the mountains of Kerry.

Many thousands of years ago Ireland was joined to Great Britain. This is shown first of all by the likeness of the rocks. The mountains of Donegal are composed of the same rugged, hard rocks as the Scottish Highlands. The volcanic rocks of the Antrim plateau are exactly the same as the rocks that build up many of the Inner Hebrides. In both cases, too, the black volcanic rocks rest on a foundation of white chalk rock, making a very striking contrast. Again, if the Southern Uplands were continued across to Ireland they would join the hills of County Down. If we examine these hills, however, we shall find that they are composed of exactly the same kind of rocks as the Southern Uplands of Scotland. Finally the rocks surrounding the granite ridge of the Wicklow Mountains resemble in all respects the rocks on the opposite sides of the Irish Sea round Snowdon.

The animals of Ireland, too, are the same as those of Great Britain, but there are not so many different kinds in Ireland. There are about twenty kinds of mammals in Ireland, forty in Great Britain, and about ninety in Germany. In Ireland, too, there are no snakes and the mole is unknown. All these facts show that Ireland was once joined to Great Britain and the continent of Europe, but that the Irish Sea was formed before all the different kinds of animals had time to find their way from the Continent to Ireland.

The east coast of Ireland is very different from the west. On the north and west the coast line resembles that of western Scotland or Norway. The land is much indented by long sea-lochs or fiords. On the east there are broad bays and low sandy beaches. The south-west coast is noted for the number of its estuaries. These inlets differ from true fiords in several ways. They gradually grow wider from head to mouth, and at the same time steadily deeper. Fiords, on the other hand, are often narrow at the mouth and widen farther up. Fiords also do not gradually increase in depth, but are hollowed out in basins. The inlets of south-west Ireland are called rias, a Spanish word for such estuaries which are very common along the north-west coast of Spain. Rias have been formed by the gradual sinking of the land, which has allowed the sea to flood the lower portion of former river valleys.

In many places around the Irish coast the action of the waves has formed great cliffs. The huge breakers of the ocean are constantly dashing shingle and stones against the land and so cutting it back. If the land rises rapidly inland then the constant cutting back of the sea will in time produce a cliff Where the Antrim plateau faces the sea there are many splendid cliffs, while in Donegal and Achill Island there are magnificent cliffs that fall sheer into the ocean for nearly 2000 feet.

Cliff scenery, Carrick-a-Rede, Co. Antrim

There is another marked difference between the east and the west coasts. There are very few islands on the east while the west is fringed by hundreds of islands. In this respect Ireland strongly resembles Scotland. These islands show that Britain once extended much farther west than it does now. The islands are the broken remains of a land that has been partly conquered by the sea. In the north Rathlin Island is important in history, for it was there that the Scottish king, Robert the Bruce, took shelter when things were going against him.

Some of the islands off the west coast are very difficult of access. The people who dwell there speak the Irish tongue and are generally very poor. Their life is not unlike that of the inhabitants of the more remote islands of the Scottish Hebrides. The Aran Islands at the entrance to Galway Bay are very interesting. They contain many wonderful ruins that remind us that the Irish were civilised Christians when the English were pagan savages. At the present time these islands are the chief fishing centres of that part of the coast. Valentia Island, off the south-west of Ireland, is important, since from it there starts one of the most important of the telegraph cables that cross the bed of the Atlantic Ocean to America.

28. THE EMERALD ISLE

The Shannon is the longest river in Britain. It rises among the mountains of the north-west of Ireland and flows south to the flat central plain. For a long way across the plain the river falls very little and so it flows very slowly. Its banks are low and every now and then the river widens out into a large lake. These lakes are not like the Scottish inland lochs, deep and bordered by steep mountains. They are shallow, their shores slope very gently, and they often contain wooded islands. On emerging from Lough Derg, however, the character of the Shannon changes.

The river rushes down its channel over a series of rapids, and mountains rise steeply on both sides of the valley. The mouth of the river is an estuary, seventy miles long. It is a true ria and has been formed by the gradual sinking of the land relative to the sea. The river is navigable for some distance, and fair sized vessels (1000 tons) can sail up as far as Limerick, while small steamers can ascend to Athlone nearly one hundred miles above Limerick. The river flows to the west coast, but by means of canals a boat may sail from the Shannon to the north, the east, and the south coasts. The most important of the canals are the Grand Canal and the Royal Canal, both of which start from Dublin.

The rivers of the south of Ireland are very peculiar. For example, look at the Blackwater on the map. For many miles it flows due east, then all at once it turns through a right angle and flows directly south into the sea. The same thing is true of nearly all the others. If not the river itself, at least the river mouth makes this sudden bend to the south. The Lee flowing into Cork harbour, the Suir, the Nore, and the Barrow flowing into Waterford harbour, and the Slaney flowing into Wexford harbour, should all be found on the map. Notice that the word "ford" in Wexford and Waterford does not mean a shallow part of a river. The name was given by the Danes and is really the same as fiord.

On the east coast the Liffey flows into Dublin Bay. The Boyne, flowing into Drogheda Bay, is famous for the battle fought on its banks in 1690, when William of Orange defeated James II. The largest town in Ireland is situated just where the Lagan enters Belfast Lough. On the north coast, the Bann, a fine salmon river, flows from Loch Neagh and enters the sea at Coleraine. Ships can ascend Loch Foyle and the river Foyle as far as Londonderry. Besides the Bann there are quite a number of other rivers in northern Ireland that are famous for their salmon fishing.

The lakes of Ireland are mainly of the same type. Most of them occur in low, flat ground and are simply expansions of rivers. For example, Lough Allen, Lough Ree, and Lough Derg are merely wider parts of the river Shannon, and have little resemblance to lakes such as Loch Lomond in Scotland or Derwentwater in England. Between Galway Bay and Donegal Bay are Lough Conn, Lough Mask, and Lough Corrib. The river

Erne flowing into Donegal Bay drains two large lakes, Lough Erne and Upper Lough Erne. The beautiful Lakes of Killarney and Lough Neagh, the largest in the country, have already been mentioned.

Ireland is sometimes called the Emerald Isle. It gets this name from the rich, green pasture lands that cover so much of its surface. The fine, green grass lands of Ireland are due to the climate, which is on the whole moister and milder than that of Great Britain. In a former chapter we saw that in Britain the richest pastures are on the west side because most rain falls there. But Ireland is the part of this country farthest west, and therefore it is not surprising to find that it has a much larger proportion of grass land than either Scotland or England. Again, in Ireland there are no great masses of high land to catch the rainy winds and prevent the moisture from getting to the east coast. Ireland therefore has a much more uniform rainfall than either Scotland or England. There are no parts so rainy as the Welsh mountains or the Western Highlands of Scotland, and there are no places so dry as the east coast of England. The same thing holds good with the temperature. The weather is mild and there are few extremes of heat and cold. There is less difference between the temperature in summer and the temperature in winter in the south-west of Ireland than in any other part of the British Isles. The dampness of the climate has its disadvantages, and it is probably due partly to this cause that so many people of Ireland die of consumption.

Irish clocks are not kept at the same time as the clocks in England and Scotland. When the English clocks are pointing to twelve o'clock the time in Ireland is twenty-five minutes to twelve. As we go west the sun rises and sets later. The sun seems to travel round the earth in a westerly direction every twenty-four hours. When it is noon in this country, halfway round the earth, say in the east of Siberia, it is twelve o'clock at night. Halfway between here and the east of Siberia, say in a part of Canada, it is six o'clock in the morning when it is noon in England. Halfway across the Atlantic Ocean it is nine o'clock in the morning when it is noon in England, and so on. At places west of England then the clocks are behind compared with English clocks, and the farther west you go the more is the clock behind, because of course the clocks are set according to the sun.

Now in Great Britain all the people keep their clocks at the same time as the clocks at the Observatory in Greenwich, near London, although, as you will now understand, the real time, according to the sun, in Cornwall, for example, is not the same as this. But it is more convenient for everyone in Great Britain to keep the same time. In Ireland all the clocks are kept at the same time as those in the Observatory at Dublin. Dublin is just so far west of Greenwich as to make a difference of twenty-five minutes in time, and therefore the Irish clocks are twenty-five minutes behind the clocks of Great Britain. Travellers to Ireland have to be careful to alter their watches before going ashore, otherwise they would find themselves nearly half-an-hour too soon for all their appointments.

29. IRISH INDUSTRIES

It seems likely that Ireland will never have so dense a population as the Lowlands of Scotland or England. There is little chance of many great manufacturing towns ever being found in Ireland. Industrial towns must have plentiful supplies of coal in order to drive their machinery, and so in nearly all cases we find busy manufacturing districts near coalfields. Unfortunately for Ireland she has very few coalfields, and those that she has are not rich. There is a small field in Antrim, another in Kilkenny, and one or two others in different parts of the country. We shall see later that the large manufacturing towns of Ireland are all on the east coast where coal can be brought easily and cheaply from the fields of England and Scotland.

The most important industries of Ireland are farming and the rearing of live stock. The moist and mild climate of the country is very good for certain branches of agriculture. As a farming country Ireland is more like Scotland than England. It has not the sunny, dry summers of eastern England that are so good for ripening wheat and barley. The grain plant that is best suited to the moist Irish climate is oats, and more oats are grown than in Scotland. Wheat is not grown to any great extent. There is even less of this grain produced in Ireland than in Scotland, while England produces more than thirty times the amount of wheat grown in Ireland. For a long time potatoes have been very largely grown in Ireland. In fact far more potatoes are grown in Ireland than in either England or Scotland. They form the chief food of many of the peasants; indeed the poor people of Ireland rely so much on potatoes that when the crop fails there is much hunger and distress. In 1846 the potato crop failed and a dreadful famine followed, from the evil results of which Ireland has not recovered to this day.

For many years past in Ireland there has been a tendency to grow less grain and other crops, and to use the land for pasture. Ireland possesses immense stretches of very fine grass land, and we have mentioned already that the name Emerald Isle was given because of this fact. Not only is the climate moist but much of the interior is flat and low lying and better fitted for grass meadows than for anything else. If we compare the hay crop of Ireland with that of Scotland we see how important the grass lands of the former country are. Ireland produces more than five times the amount of hay that Scotland does. The presence of so much rich pasture land has made Ireland an important cattle rearing country. Dairy farming is one of the chief industries, and great quantities of butter, cheese, and eggs are sent to England and Scotland from the ports of the south and the west coasts.

Large numbers of cattle, too, are reared in order to be exported for food. Ireland possesses four times as many cattle as Scotland and twice as many horses. Pigs are also very numerous in Ireland, and there is a large trade in bacon and pork. Ireland actually possesses ten times more pigs than Scotland; with sheep, however, the case is different. The Southern Uplands and parts of the Highlands of Scotland are more suited for sheep rearing than any parts of Ireland, and so we find that Ireland is not a great sheep rearing country.

We have already seen that coal-mining is carried on to a small extent. There is some iron-mining in Antrim. In a former chapter it was stated that the Antrim plateau was formed of sheets of lava poured out of ancient volcanoes. There may have been centuries between one big volcanic eruption and the next. In the meantime lakes were formed and iron ore was laid down on the bottom of the lakes. In time this was covered by another sheet of lava, and this process was repeated several times. The iron ore is now extracted from between the layers of volcanic rock. Another ore was formed in the same place and in the same way. This is aluminium ore which is sent to the Highlands of Scotland to be smelted by the electric furnaces at Kinlochleven and Foyers.

Small quantities of gold may still be obtained from some of the rocks. This must have been worked at one time just as we saw was the case in Scotland, for many ancient ornaments of gold have been found that were made by prehistoric tribes. Copper and lead are now very little worked. Rocks of various kinds are quarried for building-stone or for decoration. Limestones and sandstones are used for the buildings in the large towns. Black marble is worked in Galway and Kilkenny, and red marble in County Cork. The green marble of Connemara is often seen in towns all over

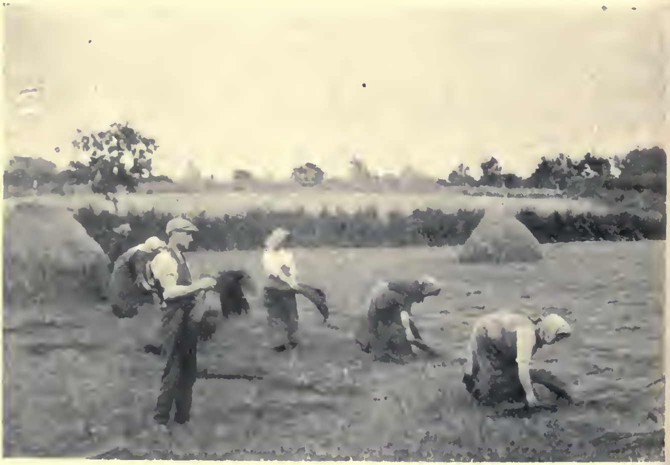
Britain. The colour is a beautiful, dark shade of green, and the stone is therefore used for making pendants, watch charms, little dishes, and various other ornaments. In several counties there are granite quarries. There is one substance, peat, which is worked all over Ireland, and used as a fuel in all parts of the country. The peat or "turf" as it is called in Ireland is cut into small blocks, allowed to dry, and then stored for fuel. In some parts it is made into bedding for horses.

Irish cottage and turf stack

Ireland is the most important linen manufacturing part of Britain. In England and Scotland little flax is now grown, but in Ireland fairly large crops are still produced. The flax is grown in the north-east of the country and is of very good quality, although the amount produced is steadily shrinking. The acreage devoted to flax is now less than half what it was thirty years ago. One reason why the flax crop is steadily diminishing is that the preparation of the fibre needs a lot of hand labour, and this is cheaper in other countries. Again, for many purposes the place of linen is being taken by jute and cotton fabrics which are much cheaper. The supplies of Irish flax are not sufficient to meet the needs of the linen manufacturers of Ulster, and therefore large quantities are imported from Russia. Linen is also sent from the continent of Europe to be bleached, for the Irish methods give a beautiful whiteness to the fabric that cannot be equalled elsewhere.

Another fabric of which a good deal is made in the country is Irish poplin. It is a substance resembling silk, and like silk is used for making ties, ribbons, dresses, and similar things. It is a mixture of silk and a cheaper fabric, either wool, cotton, or linen. Of other textiles Irish lace is well known. In many of the towns brewing and distilling are important industries. Dublin is famous for its stout, and mineral waters are also made there in large quantities. There is one great shipbuilding centre in Ireland, namely Belfast. This is rather surprising when we think of the poverty of the country in coal and other minerals. We shall consider this point again when we come to speak of Belfast in detail. The chief fishing grounds in Ireland lie off the west coast. West of Cork the seaport towns are small and are chiefly engaged in the fishing trade. The boats bring their fish to Kinsale or Valentia. From there they are sent in steamers to Milford Haven, and then sent in

A field of flax



Spreading flax

fast trains to London and other large towns. Large quantities of fish are salted on the spot and exported to America.

30. WHERE LINEN GOODS ARE MADE

Ireland is divided into thirty-two counties, which are grouped in four provinces, Ulster, Connaught, Leinster, and Munster. Ulster consists of the northern counties, Connaught the western, Leinster the eastern, and Munster comprises the southern counties of Ireland. The original division into provinces under an overlord took place in early times, but of course the boundaries of the provinces have varied a good deal since then. In the north-west of Ulster are the bare mountains of Donegal inhabited by peasants who still speak the Irish language.

Sheep are reared on the hill sides and the wool is woven on hand-looms into cloth. Donegal tweeds are well known all over Britain. In the north-east the Antrim plateau rises to a height of nearly 2000 feet. Towards the sea it falls suddenly in great cliffs that drop sheer down for a long distance. Farther south are the granite peaks of the Mourne Mountains rising in Slieve Donard to 2800 feet. The extreme south of Ulster is flat, and forms part of the Central Plain of Ireland.

The Giant's Causeway is a part of the Antrim plateau, and is one of the most interesting sights in Britain. It gets its name from the story that a number of giants began to build a road or causeway from Ireland to Scotland, but the work was never finished. You will get a good idea of what the Giant's Causeway is like from the picture on p. 177. The rock is basalt that once flowed in white-hot, molten streams from cracks in the crust of the earth.

The wonderful thing about the Causeway is the way in which the rock has cracked into regular, vertical columns generally with six sides. These pillars are so regular that they seem to have been made by human builders. In one part the Causeway takes on the shape of a giant honeycomb, in another part it is like a fan, then there is the Giant's Organ, so called from the row of great vertical pillars on the side of a cliff, and another group of huge columns is called the Giant's Loom. Then

Dyeing wool for Donegal homespun

there are wonderful sea-caves, cliffs, and reefs, each of which has a name. The high towers of one rocky point are said to have been mistaken by a Spanish Armada ship for the chimneys of Dunluce Castle between the Causeway and Portrush, with the result that the ship was wrecked on the dangerous rocks of the Causeway.

Giant's Causeway

The pillars of the Giant's Causeway are very like the beautiful columns of Fingal's Cave in Staffa. Indeed at one time the volcanic rocks of Antrim probably stretched without a break as far as the Inner Hebrides of Scotland. The columns have been formed in a very simple way. If you are walking over a bare, clay field after dry weather you will notice the ground is crossed by many cracks. These cracks are often roughly six-sided and they have been formed by the shrinkage of the clay when it dried. Look also at a box of starch and you will see that the starch has formed into little columns generally with five or six sides. This also is due to the shrinking of the starch when it dried. The columns of the Giant's Causeway are due to the shrinking of the rock when it cooled, for you must remember that practically every substance expands when heated and contracts when cooled. After the molten lava solidified into a thick sheet of solid, red-hot rock it began to cool from the surface. As it cooled it contracted and therefore was bound to crack in order to take up less room. Now it takes less force to crack into six-sided columns than into columns of any other shape. The reason for this is much too hard for you to understand, so you must simply accept it as being true. The cracking therefore took place into six-sided columns although pillars with five or seven sides are sometimes seen. It is because the Causeway is near the sea that we can examine it so well, for it has been cut into and exposed by sea-action.

The part of Ulster that extends between Belfast Lough and Lough Foyle is one of the busiest and most prosperous parts of Ireland. The people are hard-working and enterprising. A large number of the inhabitants are not of Irish blood, but have settled in Ulster or are descendants of immigrants from Scotland and England who have come across during the last three centuries. The majority of these settlers are of Scottish origin. Most of the Irish people are Roman Catholics, but in Ulster the majority are Protestants. Agriculture and manufactures in this part of Ulster are more prosperous than in any other part of Ireland. The linen industry is confined mainly to this district. County Down in the south-east of Ulster is the chief wheat-growing county in Ireland. The Lagan valley (draining into Belfast Lough) is one of the richest fattening grounds for cattle in all Ireland.

Belfast is the largest town in Ireland and is the chief manufacturing centre. The population in 1911 was 385,000 while that of Dublin was barely 310,000. These are the only large towns in Ireland. Cork, which comes next, has not a quarter of the inhabitants of either of the two chief cities. Belfast has a good situation at the head of Belfast Lough which is well placed for trade with the west coast ports of England and Scotland. The valley of the Lagan, at the mouth of which Belfast is situated, offers an easy route to the interior of Ireland. The surrounding country is a rich farming district. Flax is the most valuable crop and linen-manufacturing is the chief industry of Belfast. The flax is spun and woven, and shirts, collars, and other linen articles are made.

The town is a great shipbuilding centre. The famous yard of Harland and Wolff as a rule has a greater yearly tonnage than any other single yard in Britain, and has built some of the biggest ships on the Atlantic. The ill-fated *Titanic*, which when launched was the biggest ship in the world, was built by this firm. It struck an iceberg on its first voyage, in April, 1912, and sank in the middle of the Atlantic, causing the loss of hundreds of lives. It seems strange that Belfast should be able to build ships as cheaply as the Clyde towns, for coal and iron have to be brought to Ireland in ships. The reason is interesting, for it shows us that the geographical position of a place is not always the most important factor in its trade, but that human influence has often to be taken into consideration. There are two main reasons why Belfast is able to compete successfully with the Clyde. In the first place the firm of Harland and Wolff has an agreement with the town of Belfast under which very small rates are paid and so expenses are reduced. Again, the steel-makers of Scotland and the north of England have an agreement whereby the prices of steel are kept up in their own districts. But Ireland does not come within the scope of this agreement, and so the English and

Harland and Wolff's shipbuilding yard, Belfast

Scottish makers are in competition there. The result is that the Belfast shipbuilders can buy their steel plates actually at a lower price than the Clyde shipbuilders.

There are other industries in Belfast, including the distilling of whisky, the making of aerated waters, the curing of bacon, flour milling, and the manufacture of tobacco. Fast steamers sail between the town and Liverpool and Glasgow, and most of the trade is carried on with these two ports. The famous man of science, Lord Kelvin, was born in Belfast, although all his scientific work was done in Glasgow.

Of the towns of Ulster Londonderry comes next to Belfast in importance. It is the fourth largest town in Ireland, ranking after Cork. The name was originally Derry, and very often the town is still called by that name. The prefix London was given because the town formed part of lands granted to London trading companies in the time of the Stewart kings. Londonderry is situated on the banks of the Foyle near the head of Lough Foyle. Large steamers do not call at the port, but most of the big Atlantic liners from Glasgow touch at Moville near the entrance to Lough Foyle.

Derry itself is engaged mainly in the linen trade, and is the chief shirt-manufacturing centre. There are valuable salmon fisheries in the Lough. Perhaps it is most interesting because of the memories of the great siege in 1689. In April the protestants of Derry shut the gates of the town and defied the army of James II. Week after week the siege went on until the inhabitants were starving. Dreadful stories are told of the sufferings of the poor people but still they would not surrender. At last in July three English ships burst the boom that the forces of James had drawn across Lough Foyle and brought food to the starving garrison.

East of Londonderry is Coleraine, a seaport town at the mouth of the Bann. The industries of Coleraine are the same as almost all the larger towns in the north-east of Ireland. Linen is manufactured, there are whisky distilleries, bacon is cured, and the salmon fishing in the neighbourhood is excellent. Small ships can come to Coleraine, but large boats use the harbour of Portrush a few miles away. Portrush is now the most popular watering-place in Ulster. It has a fine beach, excellent golf links, and is the most convenient centre for visiting the magnificent scenery of the Giant's Causeway. In the summer time there is a daily sailing from Glasgow by a fast cross-channel steamer.

31. DUBLIN AND THE EAST OF IRELAND

The eastern coast has always been in closer touch with Britain than any other part of Ireland. The reason for this of course is quite plain, for Dublin is only sixty miles from Holyhead, and all the other towns of the east coast are within easy reach of the western seaports of the British Isles. For many centuries part of the east coast was ruled by the English, even although all the rest of Ireland was quite independent. The strip held by England was called the Pale and stretched roughly from the Wicklow Mountains to the Mourne Mountains. Beyond the Pale in former times there was little cultivation. Not only was the east coast of Ireland easily reached, but it formed a good starting place from which to penetrate to the interior, for there is a broad gap in the mountain rim of Ireland where the flat, central plain stretches without a break to the Irish Sea.

The Wicklow Mountains are the chief hills of Leinster. They form a broad, rugged mass which rises to over 3000 feet in Lugnaquilla. The Wicklow Mountains lie directly opposite the Snowdon group of North Wales and are very similar in character. Doubtless at one time the two areas were continuous. Like their rival peaks in Wales, the mountains of Wicklow contain many minerals, although they are not now worked to any great extent. Many of the valleys are very beautiful, Glendalough and the Vale of Ovoca being famous for their scenery. There is a well-known song in praise of the sweet vale of Ovoca.

"There is not in this wide world a valley so sweet
As that vale in whose bosom the bright waters meet;
Oh! the last rays of feeling and life must depart
Ere the bloom of that valley shall fade from my heart."

The whole district is noted for the interesting ruins of strange, old buildings, the round tower of Glendalough being the best known. The towns of this region are chiefly summer resorts. Bray was originally a small fishing village, but it has grown to such a degree as a fashionable watering-place that it is known as the Irish

Brighton. For this it has to thank its beautiful situation and also its dry climate, for it lies to the east of the mountains which extract most of the moisture from the westerly winds. Wicklow is a small seaport and a summer resort famous for its bathing.

The only large city in the south-east of Ireland is Dublin, the capital. It owes its importance largely to its position, for it is centrally situated on the east coast which is by far the busiest part of Ireland. It has always been the most convenient landing place for people coming from England, for the easiest route from the south-east of England to the west coast is by the low, broad passage known as the Midland Gate, which gives access to the Irish Sea due east of Dublin.

Glendalough

The bay on which the city stands is the best harbour in the neighbourhood, and from Dublin one can go easily to any part of Ireland. Notice how the railway lines radiate out to all parts from Dublin. In ancient times Dublin was important because there was a bridge across the Liffey at this point. It is quite a good example of a large class of towns that have arisen just because of this fact. On any river on which trading ships sail there are two points you should remember as being of special importance. One is the lowest point at which the river can be bridged, the other is the highest point to which ocean ships can come. When these two points are at the same place then you may be sure that an important town will grow up there. The two largest cities in Britain, London and Glasgow, are good examples of this principle.

In many ways Dublin is quite different from Belfast. The latter town is the great manufacturing centre, whereas Dublin is the capital. In Belfast one sees on all sides signs of trade and busy industries, while Dublin has many government offices and public buildings, and is more of a residential place. There is exactly the same contrast in Scotland between Glasgow and Edinburgh. Dublin is a beautiful town, and though it has poor slums, in the best part of the town the streets are broad and clean. Sackville Street, like Princes Street of its Scottish rival, Edinburgh, is one of the famous streets of Europe. Phœnix Park, a magnificent area and well wooded in parts, is in some respects the finest in Britain. Then the beautiful bay adds to its attractions, making the city as a whole one of the handsomest capitals in Europe.

The chief manufacture of Dublin is the brewing of stout, of which hundreds of thousands of hogsheads are exported every year. Next in order comes the distilling of whisky, and there are also large works making aerated waters. Much of the celebrated Irish poplin is made in Dublin. The chief export from Dublin is live stock which is sent mainly to Holyhead and Liverpool. In order to save time, the port of Kingstown, six miles down the bay, is used for passenger and mail traffic, and there is a regular service of fast steamers to Holyhead. A little suburb of Dublin is celebrated in a curious way. When people talk of a very riotous meeting they often say it was as bad as Donnybrook Fair. Donnybrook lies between Dublin

Sackville Street, Dublin

and Kingstown and it used to hold fairs at which a large amount of fighting took place.

Since Dublin is the capital of Ireland it possesses the main government buildings. The viceroy of Ireland has a house in Phœnix Park. There are two universities, the National University and a Roman Catholic University. Among the many famous Irishmen who studied in Dublin University the best known names are Swift, Goldsmith, and Thomas Moore.

North of Dublin there stretches a wide extent of grazing country without a single town of any size until we come to Drogheda, on the north bank of the river Boyne. In 1649, during the Civil War, Drogheda was stormed by Cromwell after a desperate resistance. Cromwell then ordered the garrison to be massacred, one of the deeds for which to this day his name is hated in Ireland. Later on at the Revolution one of the most important battles in British history was fought near Drogheda. This was the battle of the Boyne in which the army of James II was totally defeated. At the present time Drogheda is a little seaport that trades mainly with Liverpool. There are iron works, linen factories, and breweries in the town, and a good deal of grain is exported.

Farther north is Dundalk, a town of just the same size as Drogheda, and situated on Dundalk Bay about half-way between Dublin and Belfast. The chief industries are flax spinning and the distilling of whisky. The dairy produce and live stock of the surrounding district are exported from Dundalk.

32. WHERE CATTLE ARE KEPT

The south-west of Ireland is the most mountainous part of the country. In long past ages the rocky crust of the earth in this part of Ireland was subjected to tremendous pressure which squeezed the hard rocks into great wrinkles or ridges, that run in an east and west direction, or sometimes from south-west to north-east. These wrinkles now form the hilly area that we know as the Mountains of Kerry. The same east and west ridges are seen farther east in the Knockmealdown Mountains and the Galty Mountains. The whole appearance of the south-west of Ireland is affected by these parallel ridges, for they have determined the shape of the coast-line, the islands, and the river valleys.

If you look at this part of Ireland on a map you will see that there are several long, parallel bays running from north-east to south-west, chief of which are Dingle Bay, Kenmare Bay, and Bantry Bay. We have already described these under the name of rias. They have been formed by the south-west of Ireland sinking gradually below the sea, which has caused the ridges to become peninsulas and the valleys to become rias. The large number of islands off the coast is also due to the sinking of the land, only the higher parts being left above the sea as islands. In fact, whenever you see a coast line off which there are a great many islands you may be pretty sure that these islands once formed part of the mainland, but have been cut off by the sinking of the land or the rising of the sea.

There are two islands off the south-west coast of Ireland that are worth special notice. Clear Island, the most southerly part of Ireland, has a lighthouse and a signal station for reporting the movements of ships. On Valentia Island there is an important station where careful observations of the weather are taken every day. We generally get our first reports of storms from Valentia because it is our most westerly weather station, and the storms generally come from the west.

The river valleys of Southern Ireland flow in the hollows between the ridges, and so most of them flow from west to east. The sudden change in their courses when they approach the sea has already been pointed out. The rivers flowing into Waterford harbour (the Suir, the Nore, and the Barrow) are peculiar in that they all rise near one another in the Slieve Bloom Mountains, then separate widely, and finally join again at their common mouth. The poet Spenser mentions this in the *Faerie Queene*.

> "The first the gentle Suir that, making way
> By sweet Clonmel, adorns rich Waterford;
> The next, the stubborn Nore whose waters gray
> By fair Kilkenny and Rosseponte broad;
> The third, the goodly Barrow which doth hoard
> Great heaps of salmon in his great bosom:
> All which, long sund'red, do at last accord
> To join in one, ere to the sea they come;
> So flowing all from one, all one at last become."

The climate of Ireland as a whole is mild, but especially so in the south, where the winters are actually as mild as in the south of Italy. There is abundant rain and so the pasture-land is exceptionally rich. Therefore we find that in the south of Ireland dairy-farming and live-stock rearing are carried on to a greater extent than in any other part of the British Isles. County Cork is famous for its butter. Live stock is exported from all the ports of the south coast. Large numbers of pigs are kept, and bacon-curing is an important industry in many of the towns. Another thriving branch of farming is the rearing of poultry. Irish eggs are sent practically to every town in Britain.

Waterford, from the west

Many of the valleys of this part of Ireland are well suited to the growing of various crops. For example, more than half the barley produced in Ireland is grown in the basins of the rivers that drain into Waterford harbour and Wexford harbour. Because of its fertility the low ground stretching from the Suir past Tipperary to Limerick is called the Golden Vale. The Suir valley itself is the best corn land in the whole country.

The higher parts of Southern Ireland are bare and deserted, and the people are poor. In a few places mining is carried on, and metals are worked on a small scale, the chief being copper. Marble of good quality is found in County Cork. North-east of Kilkenny coal is mined, and there is another small field in the north-west of County Cork. But mining is not nearly so important an industry as agriculture.

Even the manufactures are such as grow up among a farming community. For example, the distilling of whisky makes use of the barley grown in the neighbourhood, the manufacture of leather has arisen from the large numbers of cattle that are reared, the pig farmers make possible the large bacon-curing factories found in many of the towns. Most of the inhabitants live along the coast. Inland the only well-populated parts are the rich valleys of the Suir and the Nore, where the fertile land attracts a fair number of people. In fact, Clonmel on the Suir and Kilkenny on the Nore are the only inland towns of any size in all the south of Ireland.

Cork ranks third among the towns of Ireland, although it is not nearly so large as Belfast or Dublin. Belfast has five times as many inhabitants as Cork. The town is situated where the river Lee enters the splendid inlet called Cork harbour. The river is navigable for a little way above the town. Cork is the

Cork, from the west

greatest centre in Ireland for the export of agricultural produce. Great quantities of butter are sent to Great Britain as well as cattle, eggs, bacon, and pork. There are works for bacon-curing, distilleries, and leather factories. Just as the fast traffic of Dublin is carried on at Kingstown, so the fast traffic of Cork is carried on at Queenstown, which is situated on an island in Cork harbour, and is a very important calling place for Atlantic liners. The mails from America are landed at Queenstown, sent by rail to Kingstown, carried by fast steamers to Holyhead, and then sent by special trains to London and other centres. Cork harbour is very strongly fortified. Cork is the nearest port to the lake and mountain district of Killarney.

Killarney itself is a straggling market town serving as a centre for the surrounding district, which is notable for its large number of small farms, each tenanted by the owner, who in many cases has received help from the Government to buy his farm. The mild climate has much to do with the beauty of the district about the lakes of Killarney. The marvellous richness of the trees and flowers is one of the chief charms of this part of Ireland.

Going east along the coast from Cork we find the principal towns at the mouths of the chief rivers, the river estuary generally forming a good harbour. Youghal (pronounced like Yawl) is on Youghal harbour at the mouth of the Blackwater. It exports Irish produce of the usual kind. The town has many interesting memories of Sir Walter Ralegh, who was mayor in 1588, and his home is still preserved in good condition. The people say that the first potato grown in this country was planted at Youghal by Sir Walter Ralegh, but it is very doubtful if this is the case. Waterford, on Waterford harbour, ranks sixth in size among the towns of Ireland. It is less than half the size of Cork, but its trade is very similar, its exports being mainly dairy produce, meat, and live stock.

The Rock of Cashel

Another town that was once a strong settlement of the Danes is Wexford, and you notice that the name has the same ending. Wexford has the usual trade in Irish produce. Like Dublin and Cork, Wexford has what is called an outport, that is, a harbour nearer the open sea. This is Rosslare, from which fast steamers connect with Fishguard, a new port in South Wales just over sixty miles away. One inland town, Cashel, in the Suir basin, deserves special mention for its historic interest. From the plain there rises a steep hill, on which can be seen the ruins of many wonderful old buildings, including a cathedral, a chapel, and a palace. The town was the ancient capital of the kings of Munster. Indeed, in Norman times all this district was dotted with strong castles and rich abbeys, most of which were wrecked in the wars of the sixteenth and seventeenth centuries.

33. MOUNTAINS AND BOG-LAND

The part of Ireland we shall now describe lies between the Kerry Mountains and Donegal Bay. The middle part, that juts out west into the Atlantic Ocean and is bounded by Sligo Bay and Galway Bay, is mountainous. In the mountains of Galway and Mayo there is some of the finest scenery in Ireland. On the other hand, the district is barren and boggy, and consequently one of the poorest in Ireland. The large lakes, Conn, Mask, and Corrib, are bounded by a flat plain on their eastern side, while from their western shores the mountains rise steeply. These lakes have not been formed, like so many Scottish lakes, by the digging action of glaciers. The rock on which they are formed is limestone which is easily dissolved into hollows that become filled with water and so form lakes.

You will notice that where the mountains come near the sea there are a great many islands which have been formed by the sinking of the land to some depth below the sea. In many parts the coast line is very rugged and fronts the ocean in high cliffs. On Achill Island there is some of the finest scenery in this country. The great breakers of the Atlantic Ocean dash against the foot of precipices nearly two thousand feet in height.

Most of the people in Western Ireland live near the coast. Fishing is the chief industry, Sligo and Galway being the principal fishing stations. Sheep are kept on the hill-sides and cattle in the valleys. There are many splendid natural harbours on the west coast, but there is no large seaport as the population is so small. The west coast of Ireland is really the most natural place for the big, transatlantic steamers to start from. Galway, for example, with its fine, deep bay, sheltered from the Atlantic breakers by the Aran Islands, would make an ideal seaport. But the population is not dense enough for Galway to become a large port, and trains cannot be run direct from the great cities of England on account of the break in the journey caused by the Irish Sea. So the geographical advantages of Galway cannot be fully utilised. Galway, at the head of Galway Bay, had formerly a large trade with Spain, but as this trade has fallen away, the town has diminished in importance.

Western Ireland has never had a dense population. In early times it was the refuge of those who were driven out of more fertile parts of the country. Most of the district is so barren that the people are among the poorest in Ireland. The only town of any size is Limerick. It is another example of a "bridge town," being situated at the lowest point of the Shannon that can be crossed by a bridge. Limerick owes much of its importance to being situated in the most fertile part of Western Ireland. South-east as far as the Suir stretches the Golden Vale, a valley rich in crops and cattle. The live-stock farming of the surrounding district has led to the industries of bacon-curing and leather-tanning in Limerick itself. For the leather trade, however, hides imported from South America are used as well as the native ones. There are flour mills in the town, and Irish lace is made. Limerick is the fifth town in Ireland for size, ranking after Londonderry. It was the last stronghold of James II at the time of the Revolution.

Thomond Bridge and King John's Castle, Limerick

Most of the centre of Ireland is a flat, monotonous country called the Central Plain. For many miles one can see nothing but stretches of green meadow-land varied by lakes and brown peat-bogs. One can go from

Dublin on the east coast to Galway on the west, a distance of over a hundred miles, without meeting a single hill of any importance. If you were making a journey by rail across the Central Plain you would see an endless succession of small, green fields divided by wooded, turf dykes or more seldom by slowly flowing, marshy rivers. Few living things are to be seen except oxen, but near the little farmhouses you might see a flock of geese, or a donkey, or one or two goats. The country seems almost uninhabited, for from the railway stations you see hardly anything of the towns but some spires above the trees.

The towns themselves are very small, and generally at long distances from one another. The Shannon is the principal river of the Central Plain. Its course has been described in a former chapter, but we may point out here its importance as a barrier preventing communication between east and west. This is shown very well by the fact that for a long way it forms the boundary between the provinces of Connaught and Leinster.

The peculiar character of the Irish Plain depends very largely on the fact that the rocks composing it are chiefly limestone. In England the plains are generally clay plains, or in some parts are sandy, and such plains are different in many ways from those in Ireland. As a rule limestone is a dry rock. The rainfall sinks into cracks and caverns, and runs away as underground rivers. In a limestone district such as the Peak District of England surface rivers are scarce, while underground caves and cracks are common. These caves are due to the fact that limestone is very easily dissolved by impure rain-water. But these features are only found when a limestone area is well above sea-level. The Central Plain of Ireland, however, is very low and is saturated with water, so that a good deal is seen at the surface. The soil of a wet limestone region produces very rich grass, and this is one reason for the fine grazing grounds of the Central Irish Plain. Of course the climate, too, as we mentioned before, has a good deal to do with the richness of the grass.

Cutting turf in Connemara

The two most typical features of the Central Plain of Ireland are the lakes and the bogs, and both of these features are due to the solvent action of water on the limestone. The lakes are generally found as very broad parts of the rivers where the limestone has been rapidly dissolved. The bogs were formerly lakes, but are now filled up with bog-moss. The largest area of bog-land in Ireland is the Bog of Allen, which extends from the Shannon to the Boyne.

34. RAILWAYS AND STEAMER ROUTES

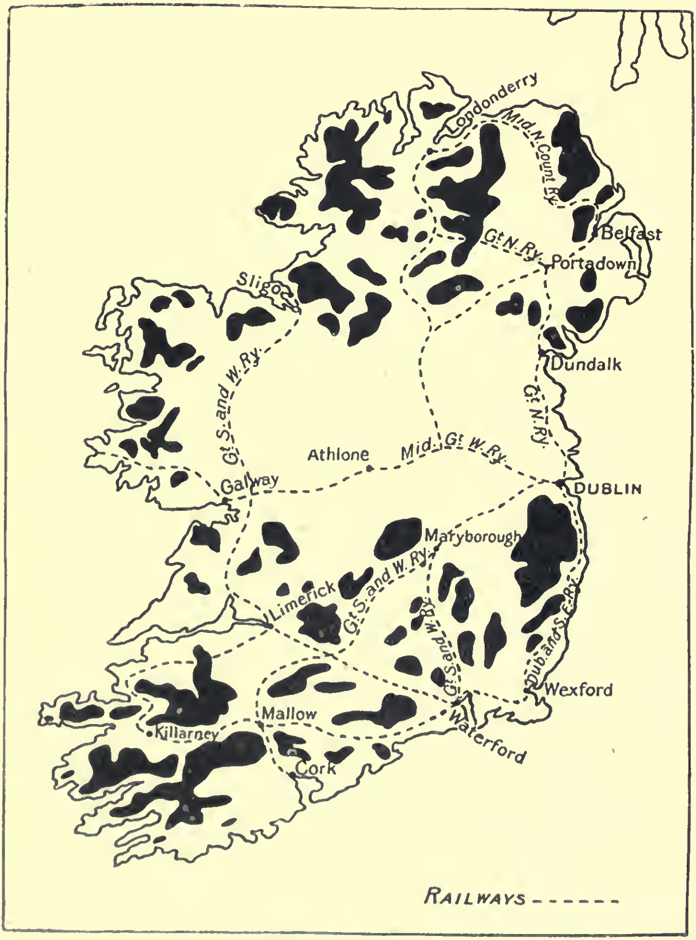
When we were dealing with the railways of Scotland we saw that the main lines of traffic avoided the high ground and kept as much as possible to the valleys. We do not find so many good examples of this principle in Ireland, because the interior is flat, and so roads and railways can go in any direction, and, again, the highlands round the coast have broad gaps between them, so that traffic can easily get into the interior. All the trade routes that we shall mention should be carefully followed on the map, but there is no need to learn them by heart.

Notice how the main railway lines spread out from Dublin, and from that city we can get direct to all parts of Ireland. North from Dublin runs the Great Northern Railway, which keeps close to the coast and passes through Drogheda and Dundalk. As the way along the coast is then barred by the high mass of the Mourne Mountains, the railway goes inland to Portadown, which is the most important railway centre in Ulster. Notice how main lines go from Portadown in four directions—one to Belfast, one to Londonderry, one to Dublin, and one south-west to the Central Plain. The line we are following goes down the Lagan valley to Belfast. From Belfast the railway goes north again, this time under the name of the Belfast and Northern Counties Railway.

But once more the hills come right up to the coast, and so the line is forced inland to avoid the higher parts of the Antrim plateau. We meet the sea again at Coleraine, and then skirt the low shores of Lough Foyle until we come to Londonderry.

The Midland Great Western Railway goes from Dublin right across the Central Plain. Follow its course to Mullingar, where it meets the line that we said went south-west from Portadown. The railway then runs west to Athlone at the south end of Lough Ree, and then to Galway on the west coast. This is one of the most monotonous railway journeys we could take in Ireland, for the land is very flat from the beginning to the end of our trip.

The Great Southern and Western Railway, as its name indicates, serves the south and west of Ireland. If you look at the map you will see that high ground stretches from the Slieve Bloom Mountains almost to Limerick. Again, from the Kerry Mountains to the Wicklow Mountains there is a series of hilly areas that form obstacles to traffic. But between these two highland districts there is a broad band of low ground which forms an easy route for a railway. The line therefore runs south-west to Maryborough, where a branch goes down the Nore valley to Kilkenny and then to Waterford. The main line keeps to the south-west until it approaches the mountains of Southern Ireland. It gets through the northern range by a broad and easy gap, then crosses the main range by a deep gap just south of Mallow, and finally turns eastward a little in order to reach Cork.



Irish Railway Map

The Dublin and South-Eastern Railway keeps very close to the coast in order to avoid the Wicklow Mountains. At Wicklow it turns inland and runs along the beautiful vale of Ovoca. The line then goes down the Bann valley to Wexford and Rosslare.

Ireland is very well served by canals. The country is so flat for long distances that it is much easier to construct a canal in Ireland than in Scotland. The two most important canals are the Royal Canal and the Grand Canal, and both go from Dublin to the Shannon. The Royal Canal keeps rather to the north through Maynooth and Mullingar, and reaches the Shannon north of Lough Ree. The Grand Canal goes almost due west to the Shannon. The Ulster Canal joins Lough Neagh and Lough Erne.

Let us look now at the different routes across the Irish Sea. A map of the British Isles shows us that the shortest distance between Great Britain and Ireland is from the Mull of Kintyre in Scotland to Fair Head. If you measure this distance you will find it to be about 13 miles, and a fast boat could do this journey in half-an-hour. There is no cross-channel route here, however, because it would not pay to make railways to these points, as they are both far away from any large towns. A little farther south Wigtownshire is just over twenty miles away from the Irish coast south of Belfast Lough. At one time there was a steamboat service between Portpatrick and Donaghadee, but the great breakers of the Atlantic destroyed the harbour at Portpatrick, washing the huge granite blocks about as if they had been pebbles. The route from Stranraer to

Larne takes two hours, and is the shortest sea-passage between Great Britain and Ireland. From Ardrossan to Belfast there is a service of fast turbine steamers. Verify the fact that the distance between these ports is about a hundred miles.

Two important seaports in Lancashire have regular sailings to Ireland. From Heysham steamers go to Belfast, and from Liverpool there are sailings to Dublin. Try to find out which route is the longer. The southern part of the Irish Sea again becomes much narrower owing to the way in which Wales juts out to the west. In particular three counties jut out farther than the others, namely, Anglesey, Carnarvon, and Pembroke. There are steamship routes from two of these counties. From Holyhead fast mail steamers go to Kingstown, a distance of less than sixty miles. The other route is from Fishguard to Rosslare. The boats make their journeys in connection with express trains which run to London, both from Holyhead and from Fishguard. From Wicklow to the tip of the long peninsula of Carnarvonshire would be a shorter route than either of the two mentioned, but just as we saw was the case with Kintyre, and for the same reason, there is no railway to the end of the peninsula. One other cross-channel route may be mentioned, namely, that between Bristol and Cork.

EXERCISES AND QUESTIONS

PART I. THE PRINCIPLES OF GEOGRAPHY

CHAPTERS 1—6

1. Draw two squares, one to represent the area of land, and the other to represent the area of water on the surface of the earth.

2. How long would it take a man to travel round the earth if he went 25 miles every day?

3. Make a triangle three and a half tenths of an inch high to represent Snowdon, and another two and nine-tenth inches high to represent Mt Everest. Compare the sizes.

4. Do you know of any places in your neighbourhood where the sea is encroaching on the land or is being silted up?

5. Name any countries in which glaciers are found.

6. Have all countries four seasons in the year? Explain your answer.

7. What are the prevailing winds in this country?

8. With a map of the world before you, say what are the prevailing winds in Canada, the West Indies, Patagonia, Brazil, India.

9. What are the Roaring Forties, the Doldrums, Monsoons, Trade Winds, the Brave West Winds?

10. What sort of fruits might be grown in California? Describe any ways in which plants can resist drought.

11. If you were to travel from the extreme north to the extreme south of Africa, what belts of vegetation would you cross?

12. Why are Mediterranean trees evergreen, while most British trees shed their leaves in winter?

13. Why can we not obtain cork from the trees of this country?

14. What kind of vegetation is typical of the following places: Borneo, Norway, Morocco, Siberia, Lapland, Central Mexico?

15. Mention different ways in which animals protect themselves from their enemies.

16. State any ways in which forest animals are suited to their surroundings. Why are deer found in coniferous forests, but not in tropical forests?

17. Mention any respects in which Australian animals differ from animals of other lands.

18. Describe the animals of the plains of Africa.

19. Why are monsoon countries densely populated as a rule? Why are Eskimo settlements always found near sea coasts?

20. Why do the Chinese dislike changes more than the people of the other monsoon lands?

PART II. THE BRITISH ISLES

CHAPTERS 1—4

1. Has this country always been an island country? Explain your answer.

2. State any advantage that an island country possesses. Write a short essay about the seas round the British Isles.

3. How have the mountains of this country been formed?

4. Is the population of Britain denser on mountains or on low ground? Why?

5. Why do the people of Great Britain who do not speak English live in mountainous districts?

6. What is the usual yearly rainfall of your own district?

7. Why is the west end of a British town usually the most fashionable part?

8. Why are the chief cattle-rearing districts on the west side of Britain?

9. Why are the chief grain-growing districts on the east side of Britain?

10. What are the chief sheep-rearing districts of the British Isles?

11. What are the two most important minerals of this country? State the places where each is found.

12. Write a short essay on coal.

13. From what countries do we obtain tea, cotton, wool, timber, wheat, dairy produce, meat?

14. Name some of the most important exports from the British Isles.

ENGLAND AND WALES

CHAPTERS 5—9

1. Measure the width of the Pennine Uplands at one or two points.

2. Name any hills of England that have the form of plateaus. Name any that are ridges.

3. Name the chief coalfields of England. What industries are associated with each?

4. Why is the Tyne a great shipbuilding river?

5. Account for the rise of the woollen industry in Yorkshire.

6. What advantages has Lancashire for the manufacture of cotton?

7. Why is North Staffordshire a great pottery-making district?

8. Why is Northampton famous for boots?

9. Give reasons for the rise of the smelting industry in Swansea.

10. Three well-known kinds of cheese are called Cheddar, Cheshire, and Dunlop (Ayrshire). Why should these places have given their names to cheese?

11. How have the manufactures of Birmingham been affected by its position?

12. Name six of the chief seaports in England.

13. Name the two chief fishing towns of England. Account for their situations.

14. Name four cross-channel routes between England and the Continent.

SCOTLAND

CHAPTERS 10—26

1. Write an essay on the Scottish Highlands.

2. Collect as many picture post-cards of Scottish scenery as you can. See whether they agree with the descriptions of Scotland in this book.

3. Why do most of the large rivers of Scotland flow to the south-east?

4. Why are the Shetland Islanders fishermen rather than farmers?

5. State any contrasts between the Outer Hebrides and the Inner Hebrides.

6. What are the chief occupations of the people of the Hebrides?

7. Why are the Scottish Highlands not densely populated?

8. Describe a deer forest.

9. What natural routes cross at Inverness?

10. Most of our large railway centres are towns well-known in history. Explain this and give examples.

11. Contrast the agriculture of Berwickshire and Wigtownshire. Explain the difference.

12. Account for the "tweed" industry of the Tweed valley.

13. Most of the trade of Scotland is carried on in the Central Lowlands. Explain this fact.

14. State any resemblances between the towns of Stirling and Dumbarton.

15. What towns in Scotland export coal?

16. Are there any geographical reasons why Dundee is noted for jam-making and linen-manufacturing?

17. Describe the course of the river Clyde.

18. Lanarkshire contains between one-third and one-fourth of all the people in Scotland. Account for this fact.

19. Why has the Clyde become such a great shipbuilding district?

20. What industries are associated with the following towns: Motherwell, Paisley, Dumbarton, Edinburgh? Try to give reasons.

21. What historical associations are connected with Edinburgh?

22. What natural routes cross at Glasgow?

23. Account for Glasgow's rise to the position of second city in Britain.

IRELAND

CHAPTERS 27—34

1. State any differences between the build of Ireland and the build of Scotland.

2. Why do we think that Ireland was once joined to Great Britain?

3. Why are the largest towns of Ireland on the east coast?

4. State the principal industries of Ireland and where each is carried on.

5. Why is Ireland not a great manufacturing country?

6. Write an essay on Ulster. Refer especially to the scenery, the industries, and the chief towns.

7. What time (roughly) would it take a steamer to sail from Ardrossan to Portrush?

8. What is the shortest sea route between Great Britain and Ireland? Measure its length.

9. What natural routes start from Dublin?

10. Account for the cattle-rearing industry of southern Ireland.

11. Describe the Central Plain of Ireland.

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